

Machine and Tool

# BLUE BOOK

A HITCHCOCK PUBLICATION

AUGUST, 1961 • 50 CENTS

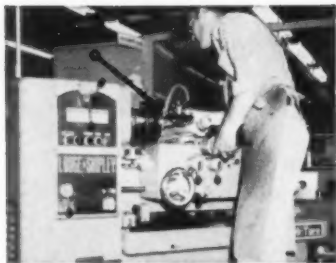
## VOLKSWAGENWERK REVISITED



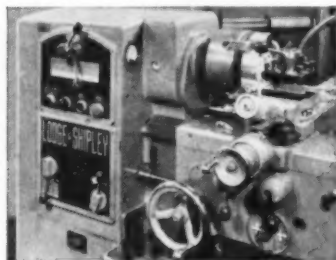
VW's Otto Hoehne fills in  
Publisher Bill Schleicher  
on men, machines, and  
management



page 92



Dalmotor Div., Yuba Consolidated Industries . . .  
"used in model shop for turning, facing and  
boring all sorts of experimental parts."

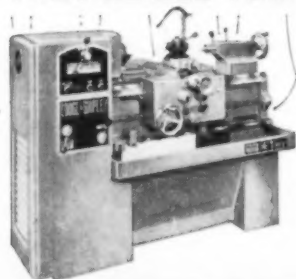


Raytheon Manufacturing Co. . . . "used for  
turning, facing and boring operations on brass,  
aluminum and steel workpieces."

Over an extremely wide range of American industry . . . for tooling, production, maintenance and experimentation . . . the Lodge & Shipley 1307 HI-TURN (10") Lathe is making a record of true economy. With literally dozens of big lathe features, the HI-TURN is still priced substantially below many lathes having fewer features, less horsepower and lighter construction.

Turn your attention to HI-TURN. Find out why these and many other lathe users are ordering and reordering HI-TURN Production and Tracer Lathes to replace or supplement larger, far more costly lathes. For complete details, request Bulletin 331, The Lodge & Shipley Co., 3074 Colerain Ave., Cincinnati 25, Ohio.

## THEY'RE ALL TURNING TO **Hi-Turn**

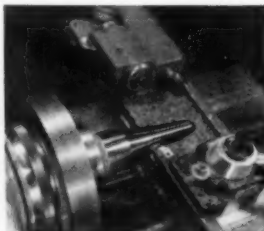


*... your Lodge-ical choice*

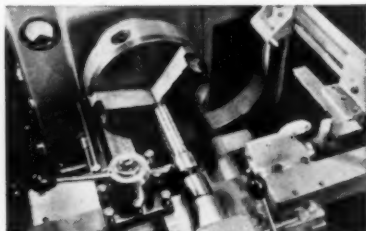
## **Lodge & Shipley**



Rocketdyne Div., North American Aviation . . .  
"held OD turning to a tolerance of .0003."



Leading glass manufacturer . . . "unheard of economy, ease and speed of production" on machining and reworking glass bottle tooling.



Indiana Gear Works . . . has earned a reputation of "excellent for high production."

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August, 1961

1

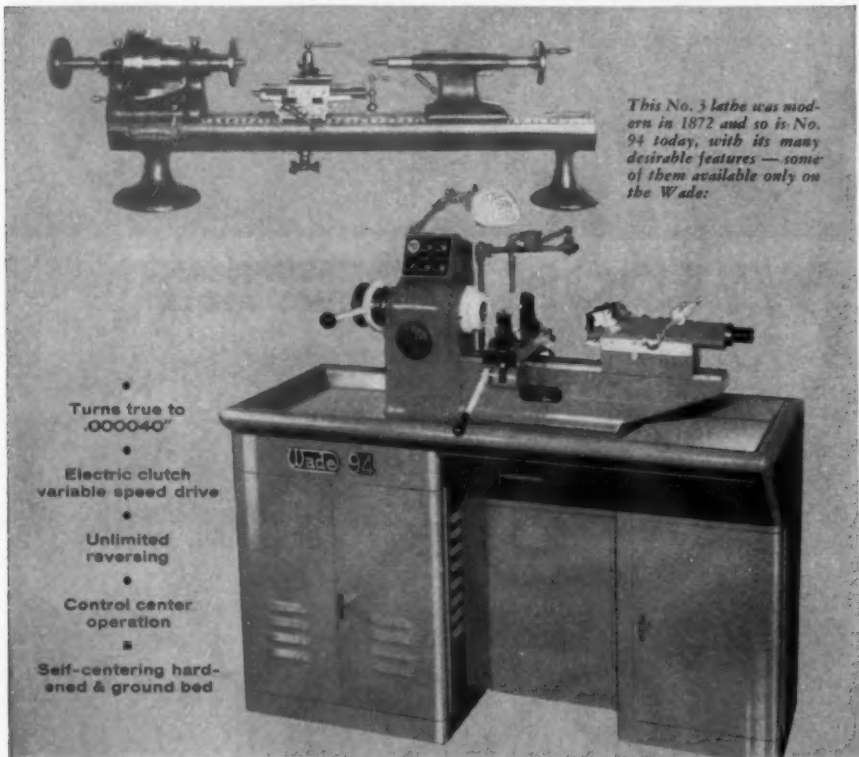
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# COVEL

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- Self-centering hardened & ground bed

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# Machine and Tool BLUE BOOK

Vol. 56, No. 8, August, 1961

*for the Men of Action in Metalworking*

## **VOLKSWAGENWERK REVISITED**

Otto Hoehne, production director of V.W.'s Wolfsburg plant, comments on men, machines, and management problems in an interview with BLUE BOOK's publisher Bill Schleicher.

## **AND NOW, 5-AXIS TAPE-CONTROLLED INSPECTION**

102

Tape control is again called upon to speed production—this time to inspect internal and external dimensions of symmetrical objects—without the use of expensive fixtures.

## **STANDARD TIME DATA—FOR "GUESS-LESS" ESTIMATING—PART 2**

106

Part 2 of the series by E. A. Cyrol examines the selection and description of elements for milling operations. Examples are shown of one firm's standards for setting up milling machines and also its standard data sheets.

## **GRINDING WHEEL LOADING MINIMIZED BY ULTRASONICS**

116

A transducer mounted on the wheel guard of a surface or cylindrical grinding machine can produce a force field at the wheel's surface that is enough to inhibit wheel loading.

## **HOW TO FASTEN CARBIDE TO STEEL—PART 2**

118

Mechanical methods of attaching carbide to steel are discussed this month by author Grant Morrison.

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MACHINE and TOOL BLUE BOOK

## CONTENTS continued

### ELECTRONIC GAGING—POLAR TRACING

#### CONTROL BEARING RACE PRODUCTION 125

How electronic gaging is used during machine setup and inspection is described by Charles Hoyt, gage engineer, of New Hampshire Ball Bearings, Inc.

### ENGLISH-LIKE LANGUAGE DIRECTS TAPE PRODUCING COMPUTER 130

IBM's recent announcement of a new tape preparation system should speed preparation of tapes for machining in three-dimensions.

### COLUMNISTS

#### INTERESTING MOTIONS L. Kasper 115

This month the author describes a linkage that operates a ratchet in one direction from a drive shaft that has reversing rotation.

#### CHIPLESS MACHINING C. H. Wick 127

"High-Energy-Spark Forming" is explained this month. This process, which shows much promise, is convenient and economical.

#### THE PRACTICAL DIEMAKER P. Prikos 131

"Know Your Costs," says Paul Prikos, "for profitable operations." Paul shows the forms he uses for keeping track of die building and maintenance costs.

#### NUMERICAL CONTROL FOR THE MACHINE SHOP J. J. Childs 137

"The Controlling Medium—PUNCHED TAPE" is analyzed, with emphasis on the latest thinking on 1" wide tape.

### DEPARTMENTS

With the Editor	7
THIS MONTH in Metalworking	10
Catalogs . . . Manuals . . . Bulletins	42
Book Reviews	62
What's New in Metalworking	163
Product Index	253
Advertisers' Index	257
One Last Word	263

W. F. Schleicher

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MACHINE and TOOL BLUE BOOK

WITH THE EDITOR :

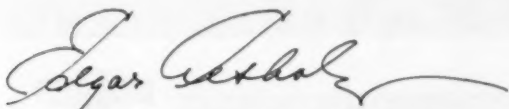
**B**  
**B**

## Man-Machine Partnership

■ Those who feel that the rapidly changing tempo of production is completely subordinating the man to the machine should find comfort in the words of Dr. Simon Ramo, executive vice-president of Thompson Ramo Wooldridge. On the contrary, he says, the coming science of "intellectronics"—the partnership of man and electronic machine—will vastly extend the powers of the human mind and the senses during the rest of this century.

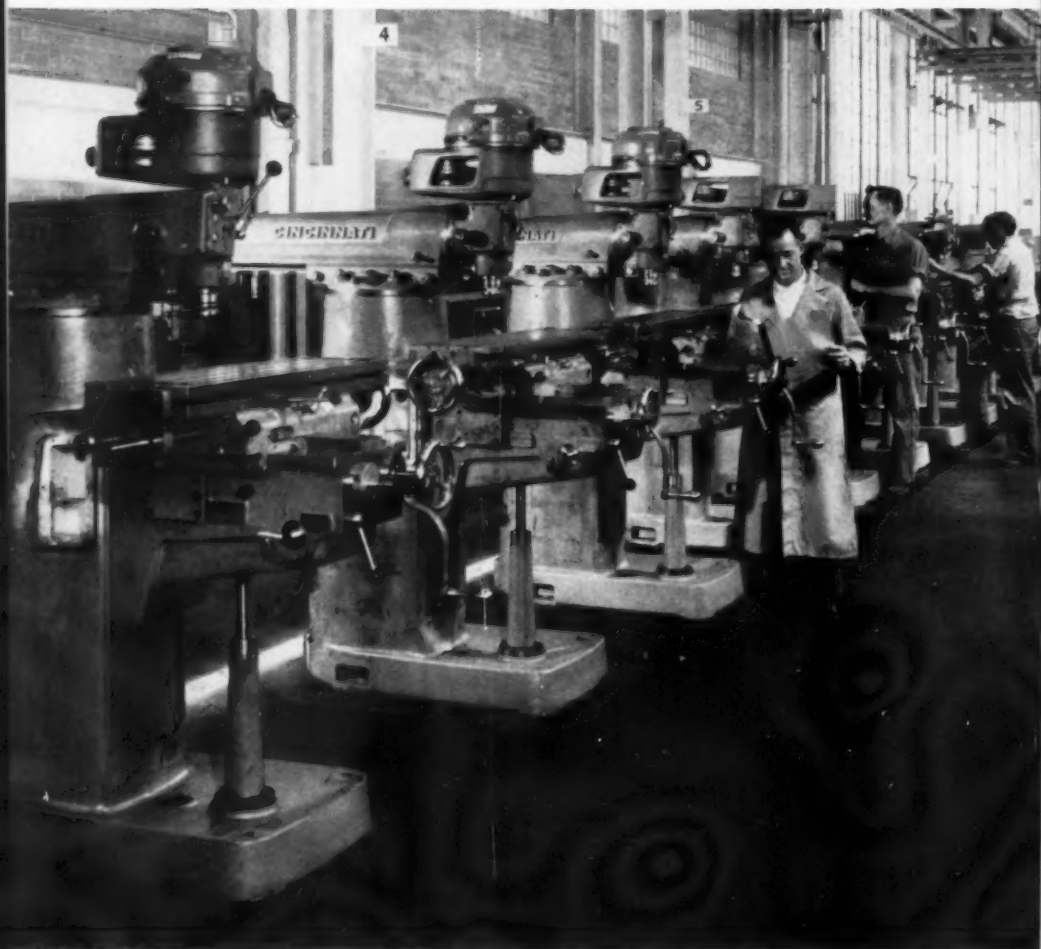
In every area of processing, many functions involving mental activity better can be assigned to electronic machines, leaving the intellect of the human partner free for the high-level aspects of judgment and decision involved in the task at hand. Often today, man is preoccupied with tasks which intellectually are qualitatively beneath him, and too much for him quantitatively.

As a case in point, scientist Ramo contends, intercontinental ballistic missiles would yet be many years away if the brains of the designer were not extended by electronics. The thousands of flights needed to optimize design took place, not in space, but in simulation laboratories, where the election of the right combination of parameters—too huge a task for human comparison and sorting—was made by a man-machine intellectronics partnership.



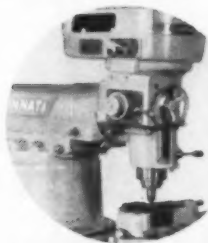
Edgar Altholz

You can perform all these toolroom operations .

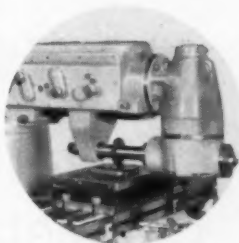


KNEE TYPE AND BED TYPE MILLING MACHINES • DIE SINKING MACHINES • VERTICAL BROACHING MACHINES

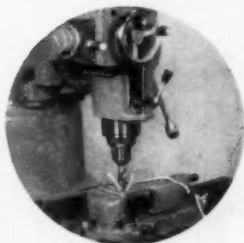
THE CINCINNATI MILLING MACHINE CO., CINCINNATI 9, OHIO



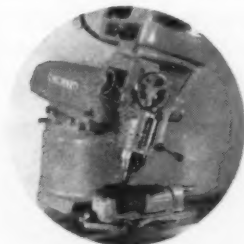
Vertical Milling



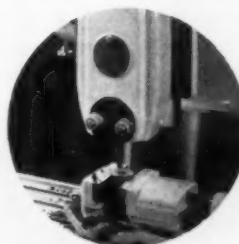
Horizontal Milling  
on the new H-V



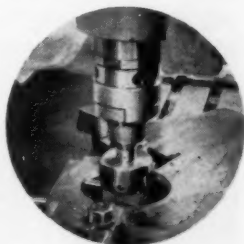
Drilling



Angular Milling



Shaping



Boring

## ... on various styles of **TOOLMASTER** MILLING MACHINES

Toolmasters are ace-high in tool and die shops everywhere . . . for handling a wide variety of light-duty vertical and angular milling operations, and drilling, boring and shaping as well. Now this hard-working Toolmaster line is extended still further through the addition of the new H-V style, a turret type machine for both horizontal and vertical operations.

Versatility is but one of many reasons why Toolmaster is the machine favored for work within one or two hp classification: the knee is extra wide and square gibbed; graduated dials are the kind operators like, large and easy to read; oil-shot lubrication extends the productive life span of the machine; electrical controls are built-in; a variety of attachments is available.

You will be highly pleased with Toolmaster performance. Want more information? Just write or telephone for Catalogs M-2229 and M-2110.

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MILLING MACHINE DIVISION

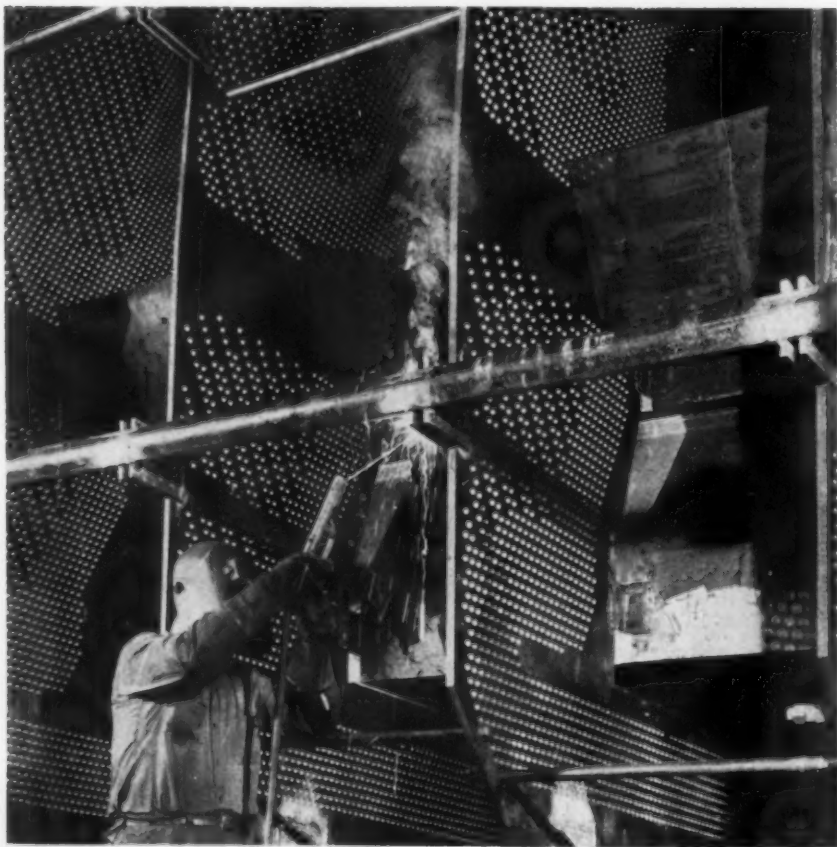
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# BB

## THIS MONTH in Metalworking

**When hole making becomes a chore, it's time to get a machine to do the job! Worthington Corp.'s Harrison,**

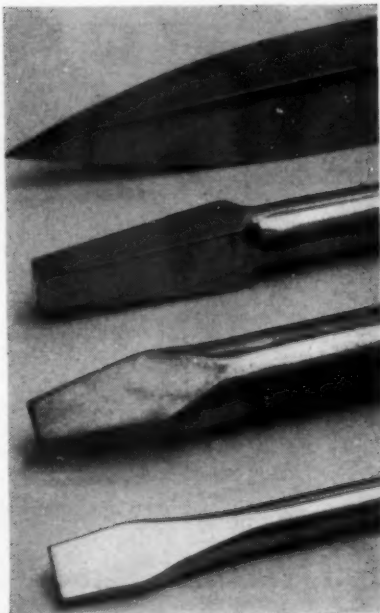
**N.J. plant sometimes had to drill as many as 160,000 holes in three-quarter thick steel plates for just one of its**



 **NOW**  
**SWAGE PARTS**  
**LIKE THESE** 

**SIMPLY  
QUICKLY  
AT LOW COST**

Requires no  
additional machining



**NEW DEVELOPMENT  
IN SWAGING\***

provides lowest cost method for  
producing rectangular, tapered,  
and formed cross sections from  
entry rounds, squares, or rec-  
tangles.

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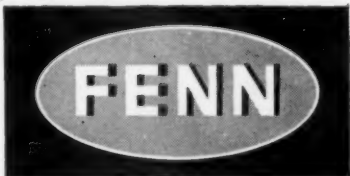
\* Patents Pending

Actual unretouched photo of  
swaged samples include from top  
to bottom: Harrow spike, auger  
bit shank, soldering iron tip, and  
screwdriver.



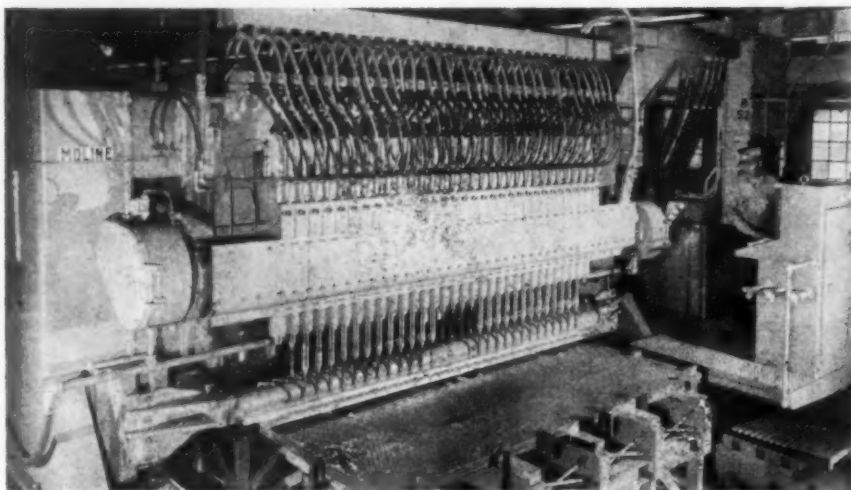
Fenn engineers welcome the op-  
portunity to evaluate and make  
recommendations for application  
to your production requirements.

*Another Great First by*



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condensers, so it sought a faster method of drilling holes.

Thanks to farsighted thinking on the part of management, the plant now has the world's biggest multi-spindle drill. Tape controlled, the 32-spindle machine can drill more than 2000 holes per hour in any hole va-

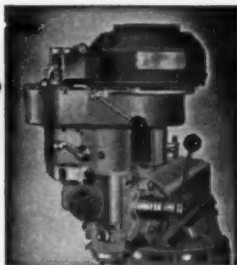
riety needed for past or future design.

The \$250,000 machine, which was built by Moline Tool Co., weighs 100,000 pounds. Control of the machine is by perforated tape, which is stored and used again whenever the need for that particular pattern of holes arises. • • •

**"Congratulations and good luck!"** says Volkert Stampings' Jack Kleinoder (center) to several honor graduates of the apprentice training program of the New York Tool & Die Institute. The past president of the National Tool, Die & Precision Machining Association pointed out to the highly skilled

class that, "We need more and better trained and highly skilled men in every field of metalworking industry. We also need more dedication to the job and pride in workmanship—pride in having done a job well—pride in accomplishment which supersedes the monetary return." • • •





*variable speeds 60 to 3300 r.p.m.*



## **TREE 2UVR VERTICAL MILL**

Spindle speeds infinitely variable from 60 to 3300 r.p.m. make the 2UVR Vertical Mill useful for a wide range of work not heretofore accomplished by mills of this size. Exclusive features include:

- Roller Spindle Drive
- Automatic Collet Closer
- Head to Ram Mounting
- Power Table Feed and Rapid Traverse
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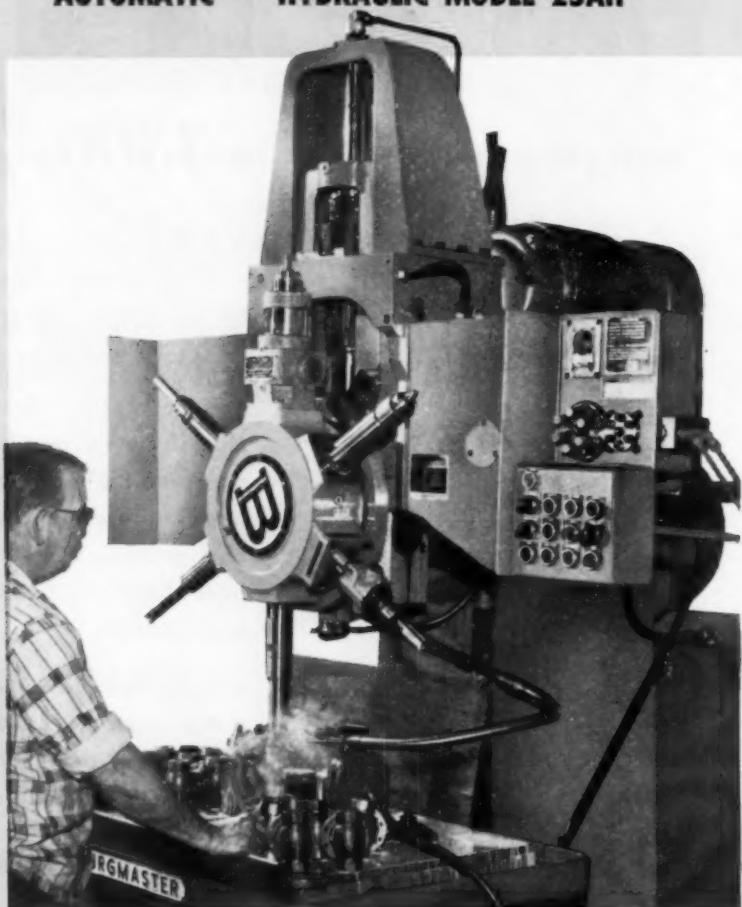
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HOW SECURITY VALVE COMPANY

# uses **Burgmaster** .....

**AUTOMATIC HYDRAULIC MODEL 25AH**

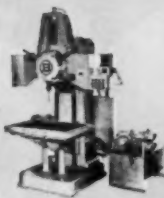
**BURGMAS-  
TER MODEL 25AH**  
6-spindle,  
1 1/4" capacity  
in steel.



**MODEL 2BH**  
6-Spindle,  
Automatic-  
Hydraulic  
3/4-inch  
capacity  
in steel



**MODEL 3BH**  
8-Spindle,  
Automatic-  
Hydraulic  
1 1/2-inch  
capacity  
in steel



**MODEL 25AH**  
6-Spindle,  
Automatic-  
Hydraulic  
1 1/4-inch  
capacity  
in steel

# ... to increase production 125%

## AND SAVE \$6,500.00 PER YEAR

(on a single isolated run)

Representing only a small percentage of Security Valve Company's, (a division of Menasco Mfg.) annual gross volume; in this single isolated case, production was increased 125%, machines were reduced from 7 to 3, and \$6,500.00 per year was saved by the installation of a Model 25AH Burgmaster Turret Drilling, Tapping and Boring Machine.

Former methods required two operations on a turret lathe, radial drill and 4 single drilling machines with considerable handling and shifting from one machine to another.

After installing a Burgmaster 6-spindle model 25AH turret drilling machine, Security is now machining valve bodies with just three machines, which formerly required the use of seven machines.

In the new Burgmaster operation, screwed

end connections of valve bodies are still formed on the turret lathe. Body bolts are drilled on the radial drill.

The units are then moved to the Burgmaster and positioned with specially designed air-operated holding fixture. Two holes are then cross drilled and tapped in side of valve body.

Screwed ends of the valves are then drilled and tapped using only four of the six available spindles of the Burgmaster. Time-per-part has been reduced from 18 minutes to 8 minutes. When projected over the thousands of these valve bodies that Security Valve annually produces, savings per year produced by the Burgmaster 25AH add up to over \$6,500.00 per year . . . plus added savings in scores of other Security production runs . . . such as doubled tool life, and reduced operator fatigue.

### JOB FACTS

**Company:** Security Valve Company (Division Menasco Manufacturing Co.)

**Machine:** Burgmaster Automatic Hydraulic Model 25AH

**Part:** Cast Iron Valve Bodies

**Lot Size:** 200

**Holding:** Special Air Actuated Fixture

**Machine Operations:** Two holes cross drilled and tapped, pipe ends drilled and tapped.

**Former Method:** Form flanges on lathe, body bolts

with radial drill, cross drill and tap two holes. On four single spindle drills, drill and tap pipe end on lathe.

**Present Method:** Form flanges on lathe. Body bolts with radial drill. Cross drill and tap two holes, drill and tap pipe ends on Burgmaster Turret Drill.

**Production Increase:** 125%.

**Other Advantages:** Greater accuracy, less rejects, double tool life, reduced operator fatigue.

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Write for bulletin describing Burgmaster 6 and 8-spindle Automatic Hydraulic Turret Drills in detail. Forty-minute 16mm sound film showing all Burgmaster Turret Drills in operation is available without charge from any office.

"0" Manual Power  
Index 1/4" Capacity

1C Manual Power  
Index 1/4" Capacity

2B Manual Power  
Index 1/4" Capacity

2BR Ram Type Radial  
Drill 1/4" Capacity

2BH Automatic Hydraulic  
1/4" Capacity

2BH Automatic Hydraulic  
1 1/2" Capacity

25AH Automatic Tape  
Controlled 1 1/4" Capacity

2BR-2BH Automatic  
Tape Controlled  
1/4" and 1 1/2" Capacity

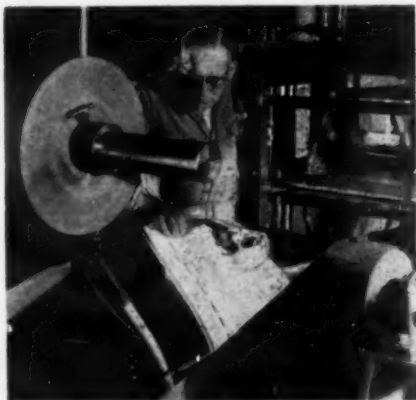


**Everyone doesn't buff after fabrication of parts** to bring out the hidden beauty of stainless steel because now stainless steel is being buffed on a production line basis at the producing mill.

The stainless steel strip with a highly reflective finish is produced by

Universal-Cyclops Steel Corp., Bridgeville, Pa., and is called "Unibrite." The process used is an added production step that imparts extra brightness and maximum corrosion resistance by buffing after the bright annealing process usually used. Consistency of finish, color, shading and reflectivity are maintained on both sides of the Unibrite strip.

Many fabricators who have tried the material have reported improved cold workability and cleaner roll forming. • • •



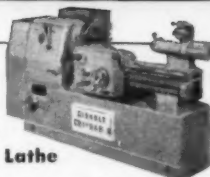
**Uniform hardness of tool steels from surface-to-center** is now possible according to an announcement from Sun Steel Treating, Inc., Detroit, Mich. The company reports that cutting tools that have been "Sunite Processed" have greater edge strength, improved shock resistance, and break

less frequently. The firm points out that its method of hardening high-speed steels should not be confused with case-hardening or nitriding. Photomicrographs of treated steels show a total absence of such surface hardening. Hardness is improved up to two full points on the  $R_c$  scale. • •

# SOMEBODY is doing it for LESS



## Gisholt CRI-DAN Model B Automatic Threading Lathe



Sets up in 8-15 minutes for maximum profits on job lots or long runs.

Produces single- or multiple-start, standard or special form, left- or right-hand, straight or tapered, internal or external threads right up to shoulders, in a matter of seconds.

Can combine threading with tracing and other machining during the automatic cycle.

Provides top quality and fine finish in any material in a fraction of time and/or cost required by milling, grinding, or special taps and dies.

Buyers can't afford to pass up a sales approach based on equipment that cuts threading costs 30-80%.

This advantage is attained with the Gisholt Cri-Dan Threading Method — that uses an inexpensive, single-point, carbide tool to cut *quality* threads in *any* material — *automatically*! Now, you can set up in 8-15 minutes and produce *any* type of thread in a matter of seconds. Accessories combine tracing and standard machining with threading for added savings. If you want to thread for less, call your Gisholt Representative or write for Catalog 1215.



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MACHINE COMPANY  
Madison 10, Wisconsin, U.S.A.

**Turret Lathes • Automatic Lathes • Balancers • Superfinishers® • Threading Lathes  
Factory-Rebuilt Machines with New-Machine Guarantee**



**Rolled structural shapes made from quenched and tempered alloy steels** are now in full-scale commercial production for U. S. Steel at the McKees Rocks, Pa., plant of The Van Dorn Iron Works Co.

Heat treated to designed strengths as much as three times that of structural carbon steel, the new shapes hold

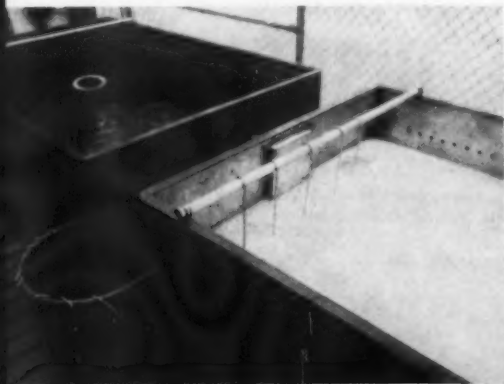
promise of "important weight and cost savings in a host of structural applications ranging from submarines to skyscrapers," according to U. S. Steel.

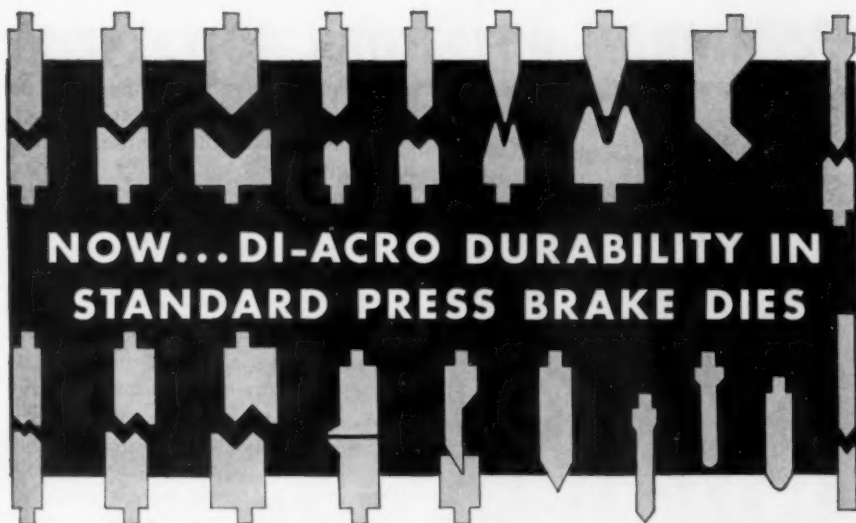
Now designers can specify shapes that have the same toughness and weldability as "T-1" steel plates in standard I-beams, channels and angles, and in lengths up to 40' • • •

**Deep down underneath that foam lies a part for an Atlas missile.** Because

the part is for the fuel and liquid oxygen system where contaminants, when exposed to liquid oxygen, will cause an explosion or a serious missile failure, it is being cleaned ultrasonically.

The cleaning system is installed near the Atlas ICBM assembly line at Convair (Astronautics) Div., of General Dynamics Corp., San Diego, Calif. It utilizes a newly developed,

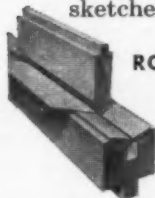




## NOW...DI-ACRO DURABILITY IN STANDARD PRESS BRAKE DIES

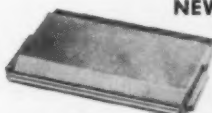
*...immediate delivery from factory stock*

Di-Acro standard v-type press brake dies are engineered for accuracy and dependability—in all press brakes. They are produced of heat treated alloy die steel for tensile strength and uniform hardness throughout. You can depend on longer lasting service. Choose from dies 6" to 12 ft. in length. Immediate delivery is available on most stock sizes. Next time you need dies . . . look to Di-Acro for the finest. Special dies will be quoted on request. Just send your sketches or drawings to our Engineering Service Department.



### ROL-FORM DIE

One die forms materials to  $\frac{3}{8}$ " thick—all angles to 60°. Hardened and precision ground rolls pivot smoothly to fold material gently—without work marks. You save time and die costs.



### NEW SNAP-FORM DIE

Form 13 different radii—0 to  $\frac{3}{8}$ "—just by changing the radius insert. Reduce set-up time and die costs. Heat treated alloy steel die with ground and polished inserts.



pronounced "die-ack-ra"

Consult the yellow pages of your phone book under Machinery—Machine Tools for the name of your nearest Di-Acro distributor or write us.



### DI-ACRO CORPORATION

formerly O'Neil-Irwin Mfg. Co.

608 Eighth Avenue • Lake City, Minnesota

**ENGINEERING • ACCURACY • DEPENDABILITY**



fully transistorized generator in modular form, delivering 25,000-watts power to the cleaning tanks. The system was designed and manufactured by Acoustica Associates, Inc.

The large cleaning system consists of two 500-gallon transducerized tanks, one for "clean" and the other for "rinse," that are alternately activated by the 25,000-watt generator. Upon activation, high-frequency sound waves flash through the cleaning or rinsing solutions in the tanks, setting up a powerful scrubbing action known as "cavitation."

The new generator operates at a frequency of 20-kilocycles. A major breakthrough over older vacuum tube systems, it affords an 80% size reduc-

tion over conventional generators and utilizes a specially-devised semiconductor circuit that eliminates tuning adjustments and meter readings. The units react instantly and automatically compensate for changes in both load and liquid levels. • • •

---

**Though the Swiss are noted for precision machining** it may be more a matter of economy-mindedness than for other reasons. While on a visit to Europe recently, T. Laurence Strimple, president, The National Acme Co., followed up progress in the experimental machining of precision miniature bearings in Switzerland. The project is important to National Acme because of the stringent precision which Switzerland's industry traditionally demands and because Acme-Gridley multiple-spindle automatic screw machines are being employed to develop the micro-finish requirements of the tiny parts.

Strimple pointed out that, "economy-mindedness plays a big role in the Swiss requirement for precision machining, because high tolerance screw machine work eliminates the necessity for a secondary grinding operation." • • •

---

**Better reserve** September 20-30, 1965 now. These are the dates established for the next Machine Tool Exposition to be held in Chicago. The committee hopes that these later than customary dates will mean cooler, more comfortable weather for those attending. • • •

# INSPECTION PROJECTOR MAGNIFIES FOR <sup>®</sup> QUALITY...

Our inspection projector magnifies cutting edges to eliminate the minute angular deflection that could cause you costly production losses . . . just one of many inspections that account for Circle R quality.

CIRCLE R saws, slitters and combination center drills must submit to constant exhaustive inspection to work their way to you. They've got to prove they can ensure you correct cutting angles, long service, and minimal downtime.

Consult these CIRCLE R Specialists . . .

**BUREAU**  
Production Mach. Sales Inc.  
**CEDAR RAPIDS**  
McNeal Tool & Supply Corp.  
**CHICAGO**  
Donald Robertson & Co.  
**CLEVELAND**  
Production Tool Co.  
**DAYTON**  
J. H. Kutz Company  
**DETROIT**  
J. L. Bradford Associates

**HACKENSACK**  
The Eaton Company  
**INDIANAPOLIS**  
Donalds Metalite  
**MEMPHIS**  
Branch-Morrell  
Tool Specialists  
**MILWAUKEE**  
Ford Tool Company  
**MONTREAL**  
Humphrey & Walton  
**NEW HYDE PARK**  
The Eaton Company

**NEW YORK CITY**  
J. V. Greenman (Export)  
**PHILADELPHIA**  
General Tool Sales Co.  
**PHOENIX**  
DiEugenio Tool Center  
**PITTSBURGH**  
Hight, Exposito & Co.  
**PROVIDENCE**  
Fred J. MacMillan  
**ROCHESTER**  
James G. Horne

## CIRCULAR TOOL CO., INC.

PROVIDENCE 5, RHODE ISLAND  
Specialists in Circular Cutting Tools Since 1923

METAL SLITTING SAWS • COPPER SLITTING SAWS • SCREW SLOTTING SAWS • COMMUTATOR SLOTTING SAWS • JEWELLERS' SLOTTING SAWS • CUT OFF SAWS • CIRCULAR  
KNIVES & ROTARY SHEAR BLADES • CIRCOLOY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS • COMBINED DRILLS & COUNTERSINKS • CENTER READERS

The advertisement features a central image of a large circular saw blade. Above it is a diagram showing a wavy line representing a cutting edge profile, with a grid background. To the left of the central blade are three smaller circular saw blades of different sizes. To the right are two more circular saw blades. Below the central blade, the text reads "PROJECTION INSPECTED" and "DEEP CUTTING SAWS". At the bottom, it says "Send for Catalog P Showing More Than 1200 Items". In the bottom right corner, there is a small inset image of a catalog cover with the "Circular Tool Co. Saws" logo and a registered trademark symbol (®).

Use postpaid card. Circle No. 210



#### **Barden Forms New Division**

Barden Corp., Danbury, Conn., ball-bearing manufacturer, has formed a division to design, construct, and market precision mechanisms. It will also con-

duct company-sponsored and contract research on ball bearings and related devices. A new one-story facility will house the division, under the management of **Bruce L. Mimms**.

#### **Covel Acquires Wade Tool**

Covel Mfg. Co., Benton Harbor, Mich., has acquired from the Wade Tool Co., Waltham, Mass., its line of hand turret lathes, finishing lathes, and toolmakers' lathes. Manufacturing, sales, and service of these lathes will be moved to Benton Harbor. The Wade lathe line has been manufactured since 1872. Covel has made precision grinders since 1874.

#### **Branson Acquires Circo Stock**

Branson Instruments, Inc., Stamford, Conn., has acquired all out-standing stock of Circo Corp., Clark, N.J. Peter K. Bloch, president of Branson, which manufactures ultrasonic cleaning and nondestructive testing equipment, said that Circo will continue to operate at its present location with no change in management or personnel. Circo makes metal-finishing equipment.

#### **Phoenix Steel Office Moves**

The Pittsburgh Sales Office of Phoenix Steel Corp., New York, has moved to Three Parkway Center, 875 Greentree Road, Pittsburgh.

#### **Moreland Is ASTME President**

William Moreland, vice-president, mfg., F. E. Myers & Bros. Co., Ashland, Ohio, was elected president of the American Society of Tool and Manufacturing Engineers.

Vice-presidents named were: David Schrom, York division of Borg-Warner Corp.; Philip R. Marsilius, Producto Machine Co.; H. Verne Loeppert, Boyd Wagner Co.; and Francis Sehn, Press Automation Systems, Inc.

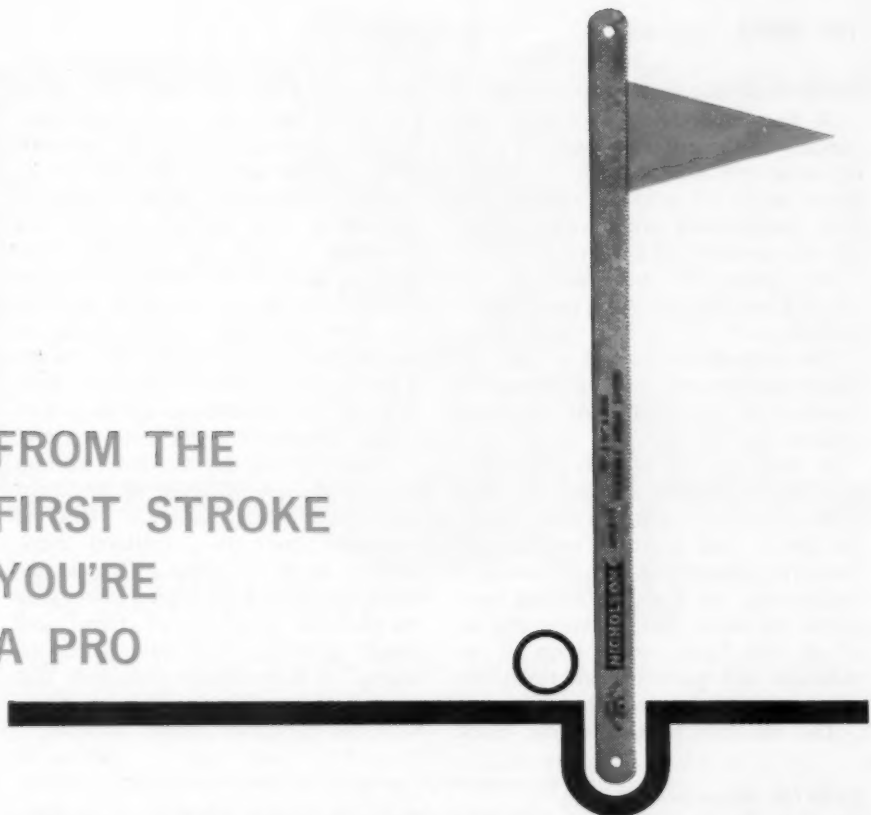
#### **Wellman Bronze Moves**

Wellman Bronze and Aluminum Co. has moved its plant facilities from Cleveland to the former Dow Metal Products Co.'s magnesium and aluminum casting plant in Bay City, Mich. Wellman leased the foundry from Dow Chemical in February of this year.

#### **Renner Has Cleveland Office**

A Cleveland office of Renner, Inc., industrial consultants and advertising agency, Philadelphia, has been opened at 14819 Detroit Ave. Manager of this office is **George Dowling**.

FROM THE  
FIRST STROKE  
YOU'RE  
A PRO



From the very first stroke of your Nicholson or Black Diamond saw blade, you'll know the pleasure of skilled hands and a top-quality tool working together. ○ You'll be holding the finest saw blade that modern technology can devise. Each tooth is made under careful quality control . . . each blade is made from the finest metals . . . designed for deep-bite cutting and long, long shop life. ○ And there's a full selection of hand hacksaw, power hacksaw and band saw blade types.\* From the first stroke of your Nicholson or Black Diamond blade, you'll be a top performer in metal cutting. \*Industrial Distributors provide the finest goods and services in the shortest possible time. Our products are sold exclusively through them.



**NICHOLSON**



Nicholson File Company, Providence 1, R. I.

Files • Rotary Burs • Hacksaw and Band Saw Blades • Ground Flat Stock • Industrial Hammers

### Computer Runs Resistor Line

A line embodying a wholly new concept in the automatic manufacture of electronic components that combines statistical quality control with fully mechanized processing—all under the guidance of a digital computer—has gone into operation at the North Carolina Works of the Western Electric Co.

The resistors must meet severe electrical requirements and be capable of functioning for thousands of years without failure.

In addition to controlling step-by-step details of manufacture, the computer can accept a production schedule for a full month's output and thereafter automatically issue detailed instructions to the fabricating machines to make and package any or all of four basic power sizes of resistors in such quantities and resistance values as may be desired.

The resistors look like tiny black

firecrackers with copper wire fuses extending from the ends. Each consists of a short ceramic rod, or core, which is first given a deposit of carbon. A conductive gold coating is applied to each end of the core for attaching a cap and wire terminal. Then a helix is cut into the carbon film to change the electrical path on the core and raise the resistance to the desired level. Finally, the resistor is encased in a cylindrical, epoxy plastic cover for protection. The machines process a resistor every three seconds.

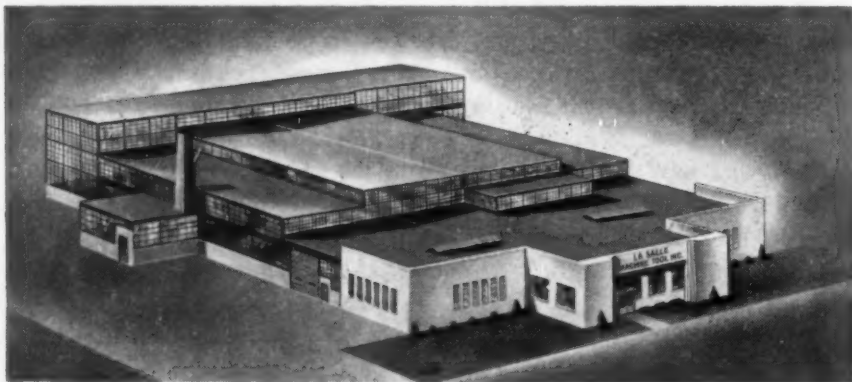
There are eleven machine stations on the line, in addition to the computer and control cabinets. One, in particular, puts on a brilliant show. Known as the "sputtering" machine, it sprays the ends of the resistors with microscopic particles of pure gold inside gas-filled bell jars. The discharge of high-voltage electricity that propels the precious metal creates a veritable miniature aurora borealis.

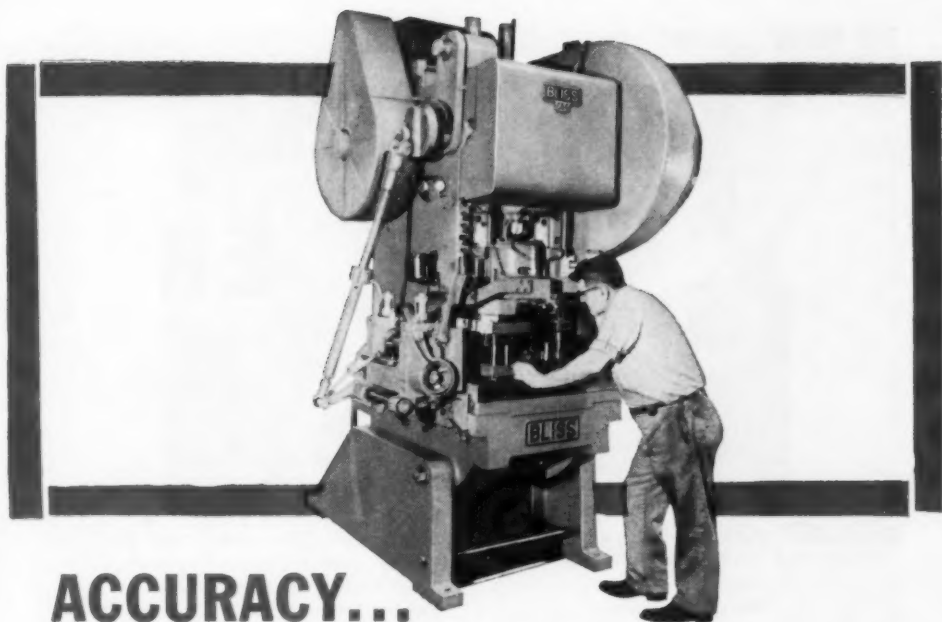
• • •

### LaSalle Machine Moves

LaSalle Machine Tool, Inc., machine tool builders, has recently moved from

Detroit to a new 65,000 sq. ft. plant in Warren, Mich.





## ACCURACY...

that pays off in longer die life, longer press runs before regrinds, with new Bliss "C's" and new Bliss "swing-out" portable feeds

The extremely rigid design of Bliss "C" inclinables keeps frame deflection to a minimum. What does this mean in terms of actual performance? . . . At Oak Manufacturing Company, Crystal Lake, Ill., eighteen new "C" inclinables, equipped with special new Bliss "swing-out" roll feeds, have cut rejection rates sharply. In the case of one very difficult stamping, the rate has improved from 10% rejections down to 1%!

The new Bliss feed is designed to swing out away from the press during hand feeding, and can be transferred from press to press.

The quality of Bliss "C" presses is spelled out both in their strength and, above all, in the precision of their construction, including nearly perfect parallelism between slide and bed, the close tolerances of all working parts, and in the high quality of material in the castings and forgings. Want more facts? Write us now for a complimentary copy of our detailed, full-color catalog.

BLISS is more than a name . . . it's a guarantee  
**E. W. BLISS COMPANY • Press Division • Hastings, Mich.**

# BLISS

SINCE 1857

PRESSES • ROLLING MILLS • ROLLS • CONTAINER MACHINERY • CONTRACT MFG. • PUBLIC SAFETY

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#### **Brubaker Has Birthday**

More than 1000 citizens of the Millersburg, Pa. area turned out to help Brubaker Tool Corp. celebrate its eightieth birthday. The company manufactures standard and special cutting tools.

Congressman John C. Kunkel gave the birthday address at the city's com-

munity park. The event was presided over by Pennsylvania Superior Court Justice Robert E. Woodside.

Shown from left to right are: Justice Woodside; Charles G. Beavers, Jr., president of the company, who is assisting Miss Diane Troutman of the city's high-school band cut the cake; and Congressman Kunkel.

#### **United Welders Has New Division in Arkansas**

United Welders, Inc., Bay City, Mich., has formed a new division, United Machines and Engineering, Inc., at Fort Smith, Ark. The division will specialize in the handling and transfer of in-process workpieces, plastics part manufacturing, application of chemical-foam insulation, and special machining operations. H. Schultz has been named office manager.

#### **Lear-Romec Expands**

Lear-Romec, Elyria, Ohio, is building a one-million-dollar commercial pump and motor plant at Santa Monica, Calif. This will provide 35,000 sq. ft. additional manufacturing space.

#### **Powertron Opens Pacific Plant**

Powertron Ultrasonics Corp., with facilities at Westbury and Garden City, N.Y., and Huntsville, Ala., has opened a West Coast subsidiary, Powertron Pacific Corp., in Los Angeles, Calif.

#### **American Chain Opens Center in Melrose Park, Illinois**

American Chain division of American Chain & Cable Co., Inc., recently opened facilities at 2040 N. Hawthorne Ave., Melrose Park, Ill. The assembly of its ACCO Registered and Kuplex sling chains and other chain lines, as well as the servicing and reconditioning of sling chains already in use, will now be done at the new plant.

## IT'S A FACT!

### DRILLHEADS

ARE OBVIOUS.

Tremendous economies from the use of multiple-spindle drillheads are obvious. Drilling one hole at a time cannot be tolerated in this day of automation!

THOMSON

### THRIFTMASTER

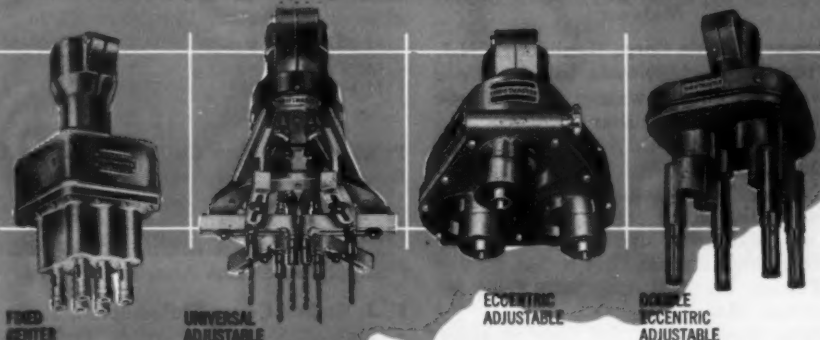
Drillheads  
are your best Drillhead buy...

1. They are better built and cost no more (Full ball bearing construction, hardened gears, spindles and driver, and precision grinding!)
2. This means they last longer
3. This eliminates down time
4. This eliminates production losses
5. This drastically reduces drilling costs

THOMSON

### THRIFTMASTER

Drillheads are designed and produced by engineers whose experience in this specific field dates back to 1923. This long accumulation of engineering technique and production "know-how" is reflected in our product—a quality tool...solid, substantial and dependable!



FIXED  
CENTER

UNIVERSAL  
ADJUSTABLE

EXCENTRIC  
ADJUSTABLE

DOUBLE  
EXCENTRIC  
ADJUSTABLE

**DRILL • TAP  
REAM • BORE  
COUNTER-BORE  
COUNTER-SINK  
FACE...with  
THRIFTMASTER**

**THRIFTMASTER**  
PRODUCTS CORPORATION

Ask NOW for our new catalog!

1020 NORTH PLUM STREET  
LANCASTER, PENNSYLVANIA  
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Also Makers of DORMAN AUTOMATIC REVERSE TAPPERS

Subsidiary of  
**THOMSON INDUSTRIES, INC.**  
makers of BALL BUSHINGS • NYLINERS • 60 Case Shafting

Use postpaid card, Circle No. 213

## THIS MONTH continued

### **Diamond Tool Manager Dies**

Joseph Gold, manager of Diamond Tool Research Co., New York, died June 10. He was 38 years old. He had previously been with the industrial diamond firms of J. K. Smit & Sons, Inc., and Anton Smit & Co., Inc.

### **Mallory V-P Dies**

Ray F. Sparrow, executive vice-president, P. R. Mallory & Co., Inc., died May 22 in Indianapolis, Ind. He was 63 years old. He came to Mallory in 1929 after an association with the Yaxley Mfg. Co. In 1936, he was elected to the company's board of directors and became executive vice-president in 1952.

## **New Distributors . . .**

### **Eastern**

**Ohio Gear Co.**, Cleveland, Ohio  
(gears and speed reducers)  
Transmission Equipment Co., Pittsburgh, Pa.

### **Midwest**

**Adamas Carbide Corp.**, Kenilworth, N.J.  
(tungsten carbide tools, tool tips, dies, wear parts, throwaway insert tool-holders, milling cutter)  
C. W. Crossen Co., 919 Kahl Bldg., Davenport, Ia.  
Cutting Tools, Inc., 624 N. Skinner, St. Louis, Mo.  
Lee Mathews Machinery Co., 318 Broadway, Kansas City 5, Mo.  
William K. Neff Co., 8809 Swifton, Affton, Mo.  
Delta Supply Co., 2705 Cold Springs Road, Fort Worth, Texas.  
Texas Aircraft Supply Co., 809 E. Main St., Grand Prairie, Texas.

**Producto Machine Co.**, Ring Punch & Die Division, Bridgeport, Conn.  
(grinding service on its perforating punches & dies)  
Federal-Bryant Machinery Co., 4639 Washington Blvd., Chicago 44, Ill.  
**Winslow Products Engineering Corp.**, Arcadia, Calif.

(drill pointer machine and automatic feed hopper)

**J. Lee Hackett Co.**, 1961 E. Milwaukee Ave., Detroit, Mich.

### **Western**

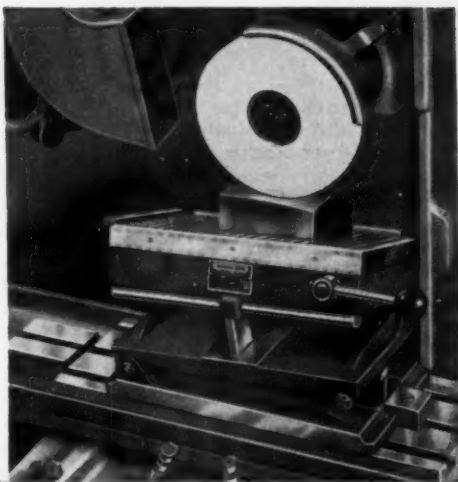
**American Brake Shoe Co.**, Denison Engineering Division, Columbus, Ohio  
(hydraulic equipment and machinery)  
Hydraulic and Air Equipment Co., Portland, Ore.

**Producto Machine Co.**, Ring Punch & Die Division, Bridgeport, Conn.  
(grinding service on its perforating punches & dies)  
Machinists' Tool & Supply Co., 2827 Supply Ave., Los Angeles 22, Calif.

**F. J. Stokes Corp.**, Philadelphia, Pa.  
(high-altitude simulation and environmental testing systems, vacuum pumps, gages, and valves, nonferrous forming presses)  
Walsh Assoc., Seattle, Wash.

**Thomas C. Wilson, Inc.**, Pneumatic Tool Division, Long Island City, N.Y.  
(portable pneumatic grinders, drills, disc sanders, and wire brushing machines)  
Dal Miller Co., 2905 E. Century Blvd., South Gate, Calif.

# Angular setups in minutes with Robbins Sine Plates!



Robbins precision angular tooling cuts grinding, machining and inspection setup time from hours to minutes—eliminates V-blocks, angle plates and "trick" buildups!

**Choose from 20 models—a type and size for every use.**

- Work areas—4" x 4" for small-part inspection and light grinding; 6½" x 6½", 6½" x 11½" and 6" x 18¼" for bench work and production surface grinding; others up to 24" x 24" for heavy machining.
- Magnetic models—Robbins Magna-Sine Plates secure the work by the most powerful magnetic force ever built into a permanent-magnet chuck.
- Non-magnetic models—Robbins Sine Plates have tapped holes in the top plate. Larger models equipped with tapped holes and T-slots.

**See your Robbins Representative, or write direct for prices and details.**

**EX-CELL-O**  
CORPORATION

Greenville Plant,  
945 E. Sater St.,  
Greenville, Ohio



EX-CELL-O FOR PRECISION

61-65R

## THIS MONTH continued

### Distributors Merge

J. C. Whitney Machinery Co. and Addy & Goetz Machinery Co., machine tool distributors in northern Ohio, have merged to form Addy & Whitney Machinery Co., with offices and showroom at 9051 Brookpark Road, Cleveland.

Consolidation of machine tool lines includes: Baldwin-Lima-Hamilton Co., Carlton Machine Tool Co., Cincinnati Shaper Co., G. A. Gray Co., Hill Acme Co., W. B. Knight Machinery Co., R. K. LeBlond Machine Tool Co., Lectrochem Sales Corp., Rehnberg-Jacobson Co., and Henry G. Thompson & Son Co.

### Portomag, General Automation, Form New Company

A new company, General Automation Mfg., Inc., has been formed by a merger of Portomag, Inc., and its Di-Cor Division with General Automation Co., Detroit. The firm, with plant and offices at Troy, Mich., will produce diamond drilling bits and machines, as well as special automated equipment.

### Bren/Weld Forms Sales Corp.

Bren/Weld Corp., Brooklyn, N.Y., has announced the formation of Bren/Weld Sales, Inc., to handle all sales, promotion, and advertising of the firm's line of welding equipment. Ingram Carner is president of the new corporation and Nathan N. Zell has been named Sales Development consultant.

### New Canadian Distributor For Cleveland Punch

The A. R. Williams Machinery Co., Ltd., has been named sole Canadian distributor for the Cleveland Punch and Shear Works' line of mechanical power presses and fabricating machines, according to an announcement made by Charles E. Huddleston, Cleveland executive vice president.

### National Ultrasonic Moves

National Ultrasonic Corp., Nutley, N.J., has moved to large plant facilities in Nutley. The new plant will provide 15,000 sq. ft. of plant space and 3,000 sq. ft. of office and engineering area. National makes ultrasonic equipment for the electronic, aircraft and missile, and metalworking industries.

### Carpenter Steel Marketing Seamless Steel Tubing

Carpenter Steel Co., Alloy Tube Division, Reading, Pa., has begun marketing extruded seamless steel tubing and pipe. Carpenter's alloy tube division has been a producer of welded stainless steel and alloy tubing and pipe for the past thirty-three years.

### Picker X-Ray Has New Division

A Special Products division to design and produce nondestructive testing systems has been formed by Picker X-Ray Corp., Cleveland. Picker is a subsidiary of C. I. T. Financial Corp. and produces radiation and other specialized equipment for industry, medicine, and science.

### Davis Enlarges Facilities

Davis division of Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has recently improved and enlarged its heat-treating facilities. William M. Ritter, sales and engineering manager, says that the division will be able to case-harden any tool, regardless of its configuration.

### U.S. Drill Head Consolidates Quarters in Cincinnati

U. S. Drill Head Co., Cincinnati, is now occupying a new plant and office building. The company's entire manufacturing and administrative operations have been consolidated in three buildings on a 14-acre site at 5298 River Road on the west side of the city.

# LOW COST



## DRILL HEAD

**THIS BULLETIN GIVES  
ALL NEEDED DATA**



Write for it today. Address  
Dept. MTB-861, The Bellows  
Co., Akron 9, Ohio. Ask for  
Bulletin BL-22.

Ideal for low-cost shop-built machines for working soft metals, wood or plastics. 3/16" drill capacity in mild steel. Adjustable 2" stroke. Choice of either 8,000 or 12,000 RPM spindle speeds. Air powered traverse. (Can be equipped with a Bellows Hydro-Check for hydraulic feed control.) Sold less valve. Can be controlled with Bellows low-voltage Electroaire Valve or any 4-way directional valve. Pulley driven. 1/3 hp electric motor recommended. Basic unit weighs only 13-1/2 lbs. Mounts in any position. Overall size 2-1/2" x 3-5/8" x 12-3/16".

The low cost of these Bellows-Locke Model 22-A Drill Units makes it well worth while to keep a half dozen or so in the tool room instantly available for quick assembly into special-purpose drilling machines. Their cost can often be absorbed in one production run.

657C-3

**Bellows-Valvair**  
AKRON 9, OHIO  
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

Use postpaid card. Circle No. 215

# GREEN PANTOGRAPH ENGRAVERS

*You Make Your Own Engraved Nameplates!*

- ELIMINATE DELAYS!
- KEEP YOUR OPERATING COSTS WHERE THEY SHOULD BE!



## PORTABLE 40-POUND BENCH MODEL 106

Here is a speedy, economical 2 or 3-dimensional engraver used by thousands of dollar-conscious companies. It features 5 positive, accurate pantographic ratios; ball bearing spindle with 3 speeds up to 14,000 rpm. Is supplied with one copy carrier that accepts all standard master type sizes. Will actually work up to 10" by any width. Height of pantograph and position of cutter are continuously adjustable.

## MODEL D-2 HEAVY-DUTY 2-DIMENSIONAL

Pantograph for milling, drilling and engraving.

Vertical adjustment of copy table automatic with Pantograph. Features: unobstructed on 3 sides to take large work; micrometer adjustment for depth of cut; ball bearing construction throughout; spindle speeds up to 26,000 rpm for engraving or machining; vertical range over 10"; ratios 2 to 1 to infinity — master copy area 26" x 10"



Write or call for full details and prices.

## NEW MODEL D2-201 PNEUMATIC ATTACHMENT

for use with Model D2 Pantograph Engraver to rapidly drill holes in printed circuits by tracing templates. Drills as many as 100 holes per minute. Equipped with foot switch, spindle air cylinder, regulating valve and pressure gauge, filter and oiler. It's ready to use as soon as it's attached to an air compressor.

## GREEN INSTRUMENT COMPANY, INC.

Dept. 386, 295 Vassar St., Cambridge 39, Mass. Tel. Eliot 4-2989

Use postpaid card. Circle No. 216

MACHINE and TOOL BLUE BOOK

# GOOD THINGS

happen to  
your production  
and profits  
when you use

# BENCO

## MASTER COLLETS

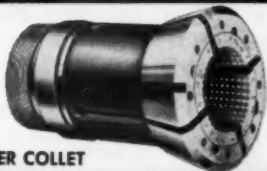
Excess set-up time will eat up your profits. That's why you should use Benco Master Collets and assorted sets of pads to take advantage of the full capacity of your machine. It's a lot quicker to change these front loading pads than to change collets.

Every Benco Collet has guaranteed accuracy assuring better production. Superior manufacturing and inspection methods provide better performance and longer productive life.

All Benco holding devices in the most used sizes, for the machines you have, are available for immediate delivery from stock.



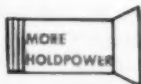
MARTIN® MASTER COLLET



"CT" MASTER COLLET



"CB" MASTER COLLET



**BENCO** COLLET MANUFACTURING CO.  
CLEVELAND 14, OHIO

Use postpaid card. Circle No. 217

THIS MONTH continued

## APPOINTMENTS AND PROMOTIONS

### Personnel Changes . . . Executive and Production



M. S. Hartley

**Maurice S. Hartley** has been appointed manager of the engineering division of Brush Instruments, Cleveland . . . Vermont Tap & Die division of Vermont-American Corp., Lyndonville, Vt., has named **Alan Harrison** company president . . . Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., announced the following appointments for its Electronic Data Processing division: **Dr. J. Ernest Smith** and **John R. Lenox**, vice-presidents of the division; **Richard H. Bloch**, director of product planning; and **Dr. Richard F. Clippinger**, technical advisor to the headquarters staff . . . Chase Brass & Copper Co., Waterbury, Conn., named **William F. Ayland**, formerly director of engineering, a company vice-president . . .

**John A. Manders** has been appointed vice-president of manufacturing at Burgmaster Corp., Gardena, Calif. . . . **Daniel A. Porco** and **Eugene A. March** have been elected vice-presidents of Crucible Steel Company of America, Pittsburgh . . . **Charles G. Herbruck** has been appointed secretary of the James F. Lincoln Arc Welding Foundation, Cleveland . . . Hughes Tool Co., Houston, Texas, named **Emil E. Pagel** director of purchases and **Gerald F. Bevill** his assistant . . . **Thomas Smith** has been appointed vice-president for marketing and manager of the Western division of Dynamic Gear Co., Inc., Amityville, N. Y. . . . Carpenter Steel Co., Union, N. J., appointed **John S. Kline** director of general services . . .



J. A. Manders

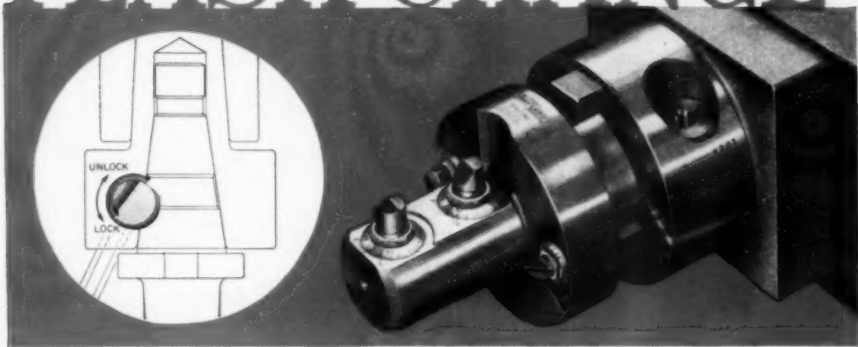


L. B. Zambon

**Louis B. Zambon** has been named vice-president of engineering for Pratt & Whitney Co., Inc., West Hartford, Conn. . . . Frank W. Egan & Co., Somerville, N. J., has appointed **T. Robert Vaucher** manager of its Metal Processing division . . . Saco-Lowell Shops Gear and Machine has named **J. M. (Jack) Sopousek** assistant to the works manager . . . **Harry D. Curtis** has been appointed manager of the Detroit division of Solar Steel Corp., Union, N. J. . . . **Dr. Ernst M. Goldstein** has been named to the research and development staff of Shieldalloy Corp., Newfield, N.J. . . . MacDermid Inc., Waterbury, Conn., appointed **Robert Voltman** product development manager . . .

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cutting tool  
system  
with

# FLASH-CHANGE<sup>®</sup>



Patented Flash-Change is another exclusive MICROBORE feature. It's DeVlieg's own system of quick change tooling for all makes and types of boring machines, milling machines, turret lathes and automated equipment. The system consists of a Flash-Change tool holder to suit the individual machine spindle and MICROBORE tooling with Flash-Change taper shanks. Clockwise rotation of an eccentric cam in the tool holder locks the cam into an NMTB taper socket in the tool shank. A counter-clockwise motion unlocks and ejects the tool. Tooling is interchangeable from one machine to another or can be reused in the same machine without resetting. Write for complete information on Flash-Change and other developments of the MICROBORE system of precision tooling.

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W. E. Shenk

**William E. Shenk** has been appointed vice-president of the Abbey Etna Machine Co., Perrysburg, Ohio . . . General Electric Co., Detroit, named **E. L. Kapernaros** manager of its Diamond Application Engineering, Metallurgical Products department . . . **Edward M. Haines** has been elected vice-president of engineering at The Stanley Works, New Britain, Conn. . . . **A. R. Johnson** and **Daniel H. Yates** have been named manager and assistant manager respectively of the Research department at Vanadium-Alloys Steel Co., Latrobe, Pennsylvania . . .

**John Somerset** has been named vice-president of the Gleason Works, Rochester, N.Y. . . . Electric Autolite Co., Toledo, Ohio, appointed **Kenneth C. Bell** chief spark plug engineer and **Frank M. Kittredge** section engineer of its spark plug division . . . **Charles F. O'Riordan** has been named general manager of the Defense Products division at Allis-Chalmers Mfg. Co., Milwaukee, Wis. . . . **Robert S. Howland** has been appointed shop superintendent at Mechanical Specialties Co., Los Angeles, Calif. . . .



John Somerset



F. H. Edgar

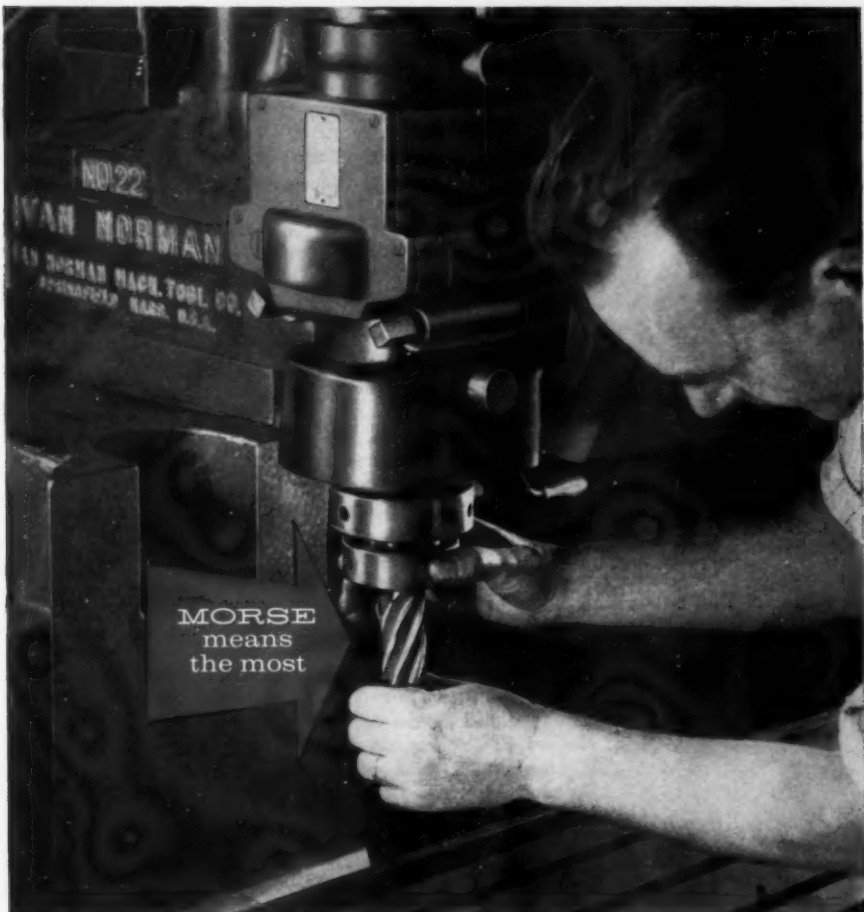
**Fred H. Edgar** has been appointed division vice-president-aluminum sales of the Metals division at Olin Mathieson Chemical Corp., New York. He succeeds **Derek Richardson** who has been named vice-president-marketing. Olin also appointed **Edward B. Reynolds** assistant director of aluminum field sales and **Charles I. Vogel** manager of the newly established Eastern sales region . . . The Barden Corp., Danbury, Conn., named **Richard I. Kern** vice-president-marketing . . . **LaGrange Worthington** was appointed vice-president of sales by the Rolled Steel Corp., Skokie, Ill. . . .

**William M. Taul, Jr.** has been named general sales manager of The Robert E. Morris Co., West Hartford, Conn. . . . Aro Equipment Corp., Bryan, Ohio, appointed **Eugene L. Jackson** vice-president-marketing of the company's automotive and industrial divisions . . . **James D. Zingg** was named general manager of plate sales at Phoenix Steel Corp., New York . . . Pratt & Whitney Co., Inc., West Hartford, Conn., appointed **Leonard V. Quin** branch representative at its Cleveland office . . . **Thomas Walsh** has been named district sales manager of the Wilton Tool Mfg. Co., Inc., Schiller Park, Ill. . . .



W. M. Taul, Jr.

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August, 1961

37

## Personnel Changes . . . Sales and Service



J. S. McLean

**James S. McLean** has been promoted to Detroit district manager for Hancock Telecontrol Corp., Jackson, Mich. . . . General Electric's Service Shops department, Schenectady, N.Y., appointed **Karl J. Doll** manager of its Eastern region . . . **Boyar-Schultz Corp.**, Broadview, Ill., appointed **Edgar C. Smith** product sales development manager . . . **Raymond C. Kendall** has been named sales manager of National Ultrasonic Corp., Nutley, N.J. . . . **Jones & Laughlin Steel Corp.**, Detroit, appointed **E. V. Mort** general manager of strip sales . . .

**Donald E. Woodruff** has been named assistant general manager of sales for Joseph T. Ryerson & Son, Inc., Chicago . . . **Crucible Steel Company of America**, Pittsburgh, appointed **Kenneth A. Matticks** manager of its stainless flat products and **Stephen A. Fronek** sales manager of silicon steels . . . **George J. Peer** was named general sales manager of Basic Inc., Cleveland . . . **National Machine Products Co.**, Detroit, promoted **Mack Quick** to the position of sales manager . . . **Leonard Seeman** was appointed general manager of the Eastern division of Greer Hydraulics Inc., New York International Airport, Jamaica, N.Y. . . .



D. E. Woodruff



V. B. Jensen

**Vernon B. Jensen** has been appointed district manager for the Cleveland Tramrail and Steelweld Machinery division of Cleveland Crane & Engineering Co., Wickliffe, Ohio . . . **Robert F. Treuer** has been named general manager of the Western operations of The Bunting Brass & Bronze Co., Toledo, Ohio . . . **Ludlow Papers**, a division of Ludlow Corp., Needham Heights, Mass., has promoted **Paul T. Kirby** to product manager of rust preventive paper . . . **Andrew E. Allis** has been named Nylok Socket Screw specialist for The Bristol Co., Waterbury, Conn. . . .

**James D. Gilbride** has been appointed California district manager of Clark Bros. Co., a division of Dresser Industries, Inc., Olean, N.Y. . . . **James Case** has joined the sales and service staff of Conforming Matric Corp., Toledo, Ohio . . . **National Automatic Tool Co.**, Richmond, Ind., has promoted **Walter E. McKenzie** to a new sales engineering position with its Chicago regional office . . . **David B. Reader** of The Lincoln Electric Co., Cleveland, Ohio, has been transferred from the company's Albany, N.Y., office to Dayton, Ohio . . .



J. D. Gilbride

## **AUTOMATIC COMPENSATION FOR MISALIGNMENT WITH EMPIRE FLOATING TOOL HOLDERS AND TAP HOLDERS**

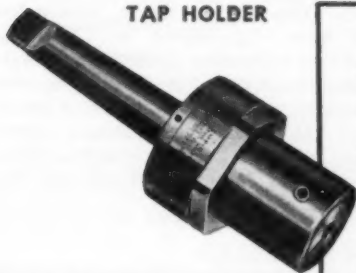
### **Check These Exclusive Empire Floating Tool Holder Features:**

- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance . . . holder has only five parts.

**TOOL HOLDER**



**TAP HOLDER**



Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

### **Check These Exclusive Empire Floating Tap Holder Features:**

- Automatically corrects parallel and angular misalignment.
- Designed to prevent freezing under tension—taps float in and out.
- Wide range of float—simple adjustment lock-nut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.

# **E**MPIRE TOOL COMPANY

11501 LAMBS ROAD • MEMPHIS, MICHIGAN

## THIS MONTH continued



R. W. Matthew

**Robert W. Matthew** has been made sales engineer at Fab-Tec, a subsidiary of the F. Jos. Lamb Co., Detroit, Mich. . . . **Allan W. Barnes** has been appointed service engineer for the newly formed Rotor Tool Co. of Canada, Ltd. . . . Norton Co., Worcester, Mass. appointed **John E. Taylor** grinding wheel sales representative for the Canton, Ohio, area . . . **John J. Farrell** has joined the sales staff of Shieldalloy Corp., Newfield, N.J. . . . Foseco, Inc., Cleveland, named **Jack Parmenter** technical sales representative in the Chicago area . . .

**Edwin S. Phillips** has been appointed regional representative of Designers for Industry, Inc., Cleveland . . . **Norman F. Kelley** has been named assistant divisional sales manager of the New Bedford, Mass., division of Revere Copper and Brass Inc., New York . . . The Carpenter Steel Co., Reading, Pa., appointed **Charles H. Harton** Florida manager . . . **Wilford E. Metzger, Jr.**, has been named assistant sales manager, Hydraulic Machinery division, Birdsboro Corp., Reading, Pa. . . . Reed Rolled Thread Die Co., Holden, Mass., named **Elmer Burt** assistant sales manager . . .



E. S. Phillips



J. W. Brugh

**James W. Brugh** has been appointed sales representative of Boice-Crane Co., Toledo, Ohio . . . **Leslie M. Nelson** has been named manager of sales engineering by Cleveland Instrument Co., Cleveland . . . Denison Engineering division of American Brake Shoe Co., Columbus, Ohio, appointed **Lawrence M. Krebs** manager of the Michigan district. Denison also appointed the following field engineers: **James C. Jones**, eastern Michigan; **Richard L. Van Voorhis**, Ohio; **Robert D. Arthurs**, midwest; and **James H. Woodward, Jr.**, southern Ohio-northern Kentucky area . . .

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## Meetings & Conventions . . .

**August 28-September 1, International Heat Transfer Conference**, University of Colorado, Boulder, Colorado, Information: American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N.Y.

**September 25-28, Fall Meeting, American Welding Society**, Adolphus Hotel,

Dallas, Texas, Information: AWS, 33 W. 39th St., New York 18, N.Y.

**September 28-29, Annual Conference & Technical Exhibit, American Production and Inventory Control Society**, Pick-Congress Hotel, Chicago, Ill., Information: APICS, 330 S. Wells St., Chicago 6, Illinois.

# TIME SAVINGS

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**Glass**

**Fiberglass**

**Laminated  
Materials**

**Some Plastics**



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with revolutionary abrasive-and-rubber **BRIGHTBOY**

## **REPLACES OLDER, COSTLIER METHODS**

COUNTLESS CASE HISTORIES attest to the exceptional success of Brightboy's unique working action. You have to see it to believe it—abrasive and rubber functioning simultaneously, speedily.

**JOB—MATCHED STOCK ITEMS** in wheels, sticks, rods, blocks and points, are specifically suited to your production. Wide range of Silicon Carbide and Aluminum Oxide textures—extra fine to extra coarse—in soft, semi-firm, firm and tough rubber binders, for machine and manual operations. The only complete, comprehensive line of soft rubber bonded abrasives.

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about this broad, new concept of abrasive applications and versatility. Write for the Brightboy Catalog-Manual covering Methods and Applications, Machine Speeds, Job-Matched Stock Items, Wheel Sizes—Complete Range.



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WELDON ROBERTS RUBBER CO.**

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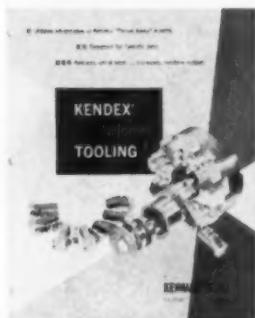
*America's Pioneer Manufacturer of Rubber-Bonded Abrasives*

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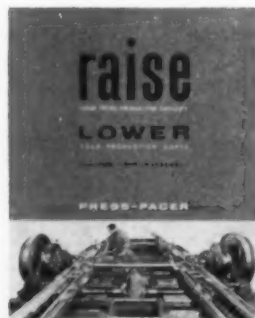
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## Catalogs . . . Manuals . . . Bulletins

. . . . . Yours without charge!  
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See Number 1



See Number 2



See Number 3

**1. Throwaway Inserts.** Bulletin B-600 shows how to use Kendex standardized adjustable units with throwaway inserts in multiple-insert and special tools. Features, mounting methods, and specifications are given. Ken-metal Inc., Latrobe, Pa.

**2. Transfer Units.** Bulletin describes Sheffield Press Pacer transfer units which automate any straight-side press or line of presses. It is a demountable transfer device for moving sheet or coil stock or pre-formed blanks through a series of metal-forming operations. The Sheffield Corp., Dayton 1, Ohio.

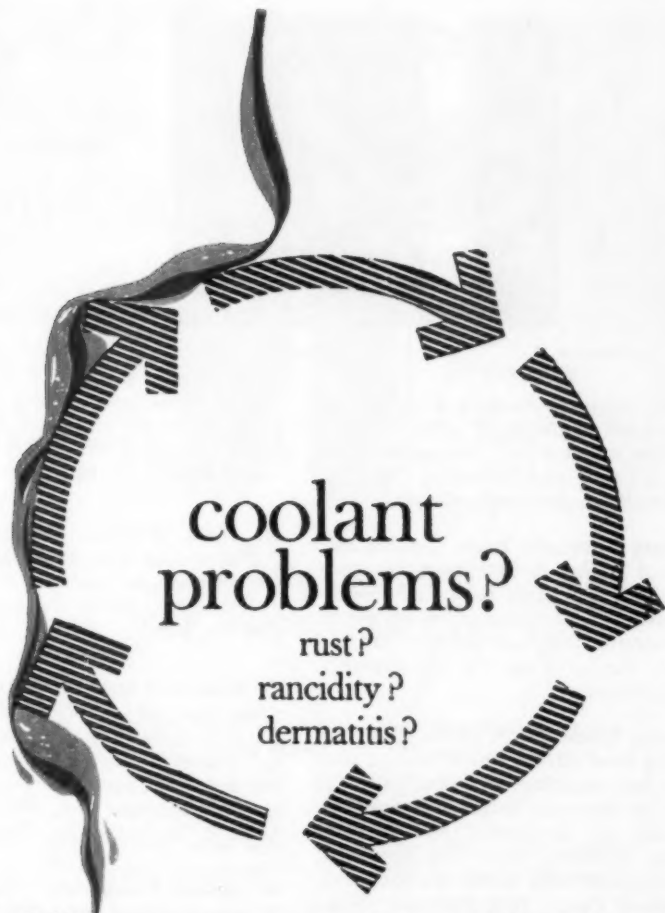
**3. "Package of Precision"** shows how four products of Moore Special Tool Co. can be teamed to jig bore, jig grind, and measure holes, and divide circles to extreme accuracies. Moore Special Tool Co., Inc., 800 Union Ave., Bridgeport 7, Conn.


**4. Universal Polishing and Grinding Machine.** Bulletin on the UNI-POL polisher-grinder for fine metallographic specimen preparation in metallurgical and quality control laboratories. It incorporates an 80 to 1200 rpm variable-speed control with a semiconductor safety circuit. Geoscience Instruments Corp., 142 Maiden Lane, New York 38, N. Y.

**5. Strip Mill Products.** A 70-page reference book that tells how to evaluate and specify mill products. The fundamental facts and basic information needed to understand and order strip steel, spring steel, shim steel, electrolytic galvanized strip steel, and flat wire products are included. Mill Strip Products Co., 2424 Oakton St., Evanston, Ill.

**6. Screw Machine Tools.** Brochure on standard screw machine tools—centering tools, revolving stops, turret bushings, full-floating reamer bushings, drill holder bushings, and slotting bushings and adapters. Mueller Industries, 510 E. Rand Road, Mt. Prospect, Ill.

**7. Friction as a Factor in Bolt Tension.** Article discusses the role of molybdenum disulfide lubricants in



Johnson's Cold Stream stops rust—resists rancidity—reduces causes of dermatitis. These problems start when your coolant gets dirty. Cold Stream stays clean week after week—even on cast iron. Cold Stream gives longest tool life. Finest finishes. Highest speeds and feeds. Best dimensional control. Cold Stream gives you all the performance you pay for. **JOHNSON'S**  **WAX**

For information, see your local Johnson Industrial distributor.

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See Number 8



See Number 9



See Number 10

helping prevent both galling and seizing of threaded connections, while permitting more uniform bolt tension at lower torque. The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

**8. Rotary Files and Tools.** Catalog lists complete Grobet line of rotary files and tools, with emphasis on tungsten-carbide rotary files. Information on selection, descriptions, and services are included. Grobet Files Co. of America, Inc., Carlstadt, N. J.

**9. Boring Machines.** A 12-page booklet showing Ex-Cell-O's line of boring machines for roughing and semifinishing, as well as for most finishing operations. Included are horizontal and vertical models, hydraulic and cam operated. Advantages of each model are included. Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

**10. Abrasive Media and Compounds.** Bulletin on problems in selecting the right abrasive media and compounds for vibratory and barrel finishing. Preplate finishing, burnishing, rapid cut-down, prevention of chip lodging, and extension of media life covered. Roto-Finish Co., 3700 Milham Road, Kalamazoo, Mich.

**11. Twist Drills.** Catalog 960 discusses thirteen styles of high-speed steel,

solid-carbide, and carbide-tipped drills available in 550 different sizes. American Twist Drill Co., 14301 W. Chicago Blvd., Detroit 28, Mich.

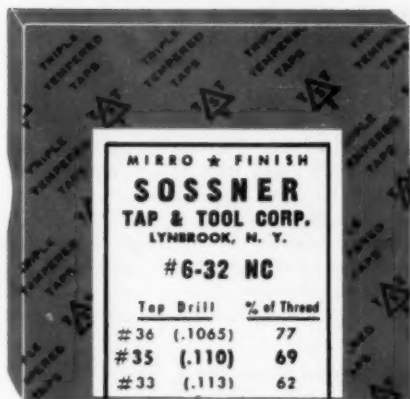
**12. O.B.I. Presses.** Catalog describes O.B.I. presses now made of Meehanite frames and ranging from 7 to 125 tons. Specifications listed. Federal Press Co., Elkhart, Ind.

**13. Miniature Drives.** Engineering specifications on standard Genevomatic drives that have shaft sizes from  $\frac{1}{4}$ " to  $\frac{1}{2}$ " diameter. A miniature cam-follower bearing is an exclusive feature. Miniature Mechanisms Inc., 4623 N. Hubert Ave., P. O. Box 10221, Tampa, Fla.

**14. Optical Comparator.** Bulletin on a 14" screen optical comparator and measuring machine which is applicable to the inspection of such parts as lead screws, die bodies, castings and forgings, and large circuit boards. Jones & Lamson Machine Co., Springfield, Vt.

**15. Unit Mechanization.** A 12-page brochure discusses an approach to automation based on unit mechanization of specific or related work functions. Included are examples of special automated machines. Jered Equipment Co., Birmingham, Mich.

# SOSSNER *Introduces* Improved Tap Identification



*Only* **SOSSNER**  
**TAP PACKAGES GIVE YOU**



- Complete Specifications  
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easy to see
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surface treatment
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**16. Hydraulic Surface Grinder.** Catalog on a new hydraulic surface grinder which features hardened rollers for table and saddle, individual hydraulic motors for cross-feed, traverse, and wheel-head elevation; and quick change from hydraulic to hand operation. Landis Tool Co., Waynesboro, Pa.

**17. Adjustable Draw Plates.** Catalog TH-62 discusses adjustable draw plates, known as Turk's heads, which are used for forming accurate squares and rectangles directly from round wire, and finishing special shapes or forming edge contours on flat metal ribbon. Fenn Mfg. Co., Fenn Road, Newington, Conn.

**18. Double-Mitre Saw.** Bulletin on a double-mitre saw featuring a 39" working height and a recessed knee control. It is a self-contained unit that receives its own scrap. Specifications on 10", 11", and 12" models are given. LeTarte Co., Inc., 18105 E. Nine Mile Road, East Detroit, Mich.

**19. Brazed Tools and Carbide Blanks.** A 32-page catalog covering Valenite's standard blanks, brazed tools, and pre-formed carbide, including charts on trouble shooting and information on pre-forms. Valenite Metals, Box 205, Royal Oak, Mich.

**20. Continuous Draw Furnace.** Bulletin 14 discusses the advantages and features of a continuous draw furnace for ferrous and non-ferrous metals. Sunbeam Equipment Corp., Meadville, Pa.

**21. Slide With Hardened Ways.** Bulletin G-710 covers a heavy-duty standard slide assembly with hardened steel ways, available in thirty-three saddle and base combinations. List of auxiliary equipment included. Russell T. Gilman, Inc., 624 Beech St., Grafton, Wisconsin.

**22. Lubricating Equipment.** Catalog covers Oil-Rite line of lubricating equipment which includes oil cups, chain oilers, oiling systems, dispensers, liquid-level gages, and valves. Oil-Rite Corp., Manitowoc, Wis.

**23. Hardfacing Electrodes and Wires.** A 44-page brochure tells how hardfacing materials can furnish wear protection to industrial and construction equipment. Descriptions of each alloy and particular resistances are included with individual applications and techniques. Air Reduction Sales Co., 150 E. 42nd St., New York 17, N.Y.

**24. Seals and Packings.** Catalog describing the physical characteristics, various



See Number 16



See Number 17



See Number 18

**POLISH METALLURGICAL SPECIMENS**

***SYNTRON***

**VIBRATORY**

# POLISHING MACHINES



## **POLISH SAMPLES FASTER, BETTER, MORE UNIFORMLY**

Easy, mechanical polishing of metallurgical specimens for examination analysis, or electron photomicrographs. Whether it's one or a number of specimens, just place in a Syntron Polishing Machine and adjust vibration to desired amplitude. Samples will move smoothly around bowl and over compound producing the smoothest surface possible.

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# Do you know what metallizing can do for you today?

***With today's improved metallizing materials and methods:***

**PLANT EXECUTIVES** find new ways to slash maintenance costs, reduce downtime, cut machine parts inventory...

**JOB SHOP OPERATORS** find new ways to build highly profitable business doing parts-salvage and maintenance work for plants in their area.

## **JOB SHOPS**

**make good money with metallizing because they save good money for local firms.**

MERCO has prepared a special bulletin detailing actual operations and costs of typical flame spraying work on shafts, templates, bearings, many other surfaces. Use coupon to get your free copy.

**NEW! Business-building kit for job shops**, to help Merco equipment owners build new business, pay off investment in minimum time, and use flame spraying to increase other machining and welding business. Contains samples of direct mail letters, post cards, envelope stuffers, photos, advertising mats. These promotion materials are available in lots of 100 at our cost, well below what you'd have to pay to print your own. One copy of kit available free — send for it today. (See coupon.)

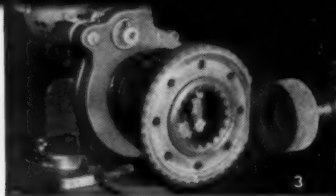
**These real-life examples show how plants save money, job shops make money with metallizing**

Necks of winding rolls in a textile mill were formerly repaired by a slow machining method, requiring highly skilled labor. Now the worn necks are built up with flame sprayed metal, quickly machined to size. Savings run \$20,000 a year.

A job shop in California specializes in flame spraying oil well pump plungers, gets all the business it can handle in spite of the fact that the plungers it hard-faces last eight times as long as new ones. The largest ones cost only \$45.00 to rebuild, against \$110 to replace. Volume on just this one profitable metallizing service: \$35,000 a year.

Valve plugs and seats, working in sand, oil and salt water, lasted only a few hours in service. Hard-faced by welding, a set cost \$155, lasted from 3 to 8 hours. When flame sprayed with tungsten carbide powder, service life was increased to a minimum of 2 weeks, 4100% longer! Cost of metallized set, \$73. But reduced downtime far outweighs the dollar savings.

A Connecticut job shop makes a very good profit when it flame sprays small



Any good mechanic can quickly master the three basic steps of metallizing: 1. prepare the surface; 2. flame spray; 3. finish.

shafts for \$27.50. The customer is happy, too—he formerly had to pay over \$50 to have shafts built up with welding.

The same job shop salvaged a big degreasing tank, value \$2,850, by flame spraying with zinc for \$683. The shop made money, the customer saved money.

A shipbuilding company installed metallizing equipment to repair such parts as pump rods, pistons, crank shafts for diesel engines, stern bushings, valve stems. A badly worn tugboat shaft, replacement cost \$3,000, was repaired and made better than new for \$400. That job alone more than paid for the METCO equipment.

From these cases you can see how modern metallizing pays, whether in plant maintenance departments or in job shops serving the many companies that

don't need their own installation. Wherever there's wear, in rotary or sliding action, there's an opportunity to save money and make money.

### New and improved materials

Among these new materials are a number of nickel, chrome, boron hard facing powders. Sprayed tungsten carbides are also widely used. Many others are available to give new values to the basic benefits of metallizing, which may be summarized as: less downtime; far less machining or grinding time, reduced parts inventory; and "better than new" performance of the metallized parts.

With savings like these there is plenty of leeway for good job shop profits and big savings for manufacturing plants. To learn more about these opportunities, check the coupon and send it off today.



**METCO INC.**  
FORMERLY METALLIZING ENGINEERING CO., INC.  
*Flame Spray Equipment and Supplies*

1115 Prospect Avenue, Westbury, L. I.  
New York Telephone: Edgewood 4-1300  
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Ltd., Chobham-near-Woking, England

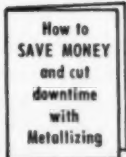
**METCO, INC., 1115 Prospect Avenue, Westbury, L. I., New York**

#### JOB SHOPS ONLY



- Send Bulletin 14, "How Job Shops Make Money With Metallizing"
- ☐ Send Business-Building Kit
- ☐ Have Field Engineer Call

#### PLANT MANAGEMENT



- Send copy of Bulletin 15, "How to Save Money and Cut Downtime with Metallizing"
- ☐ Have Field Engineer Call

Name

Title

Company

Address

City

Zone

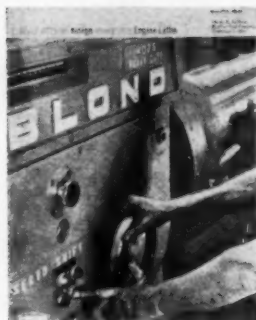
State



See Number 23



See Number 24



See Number 25

types, and operating features of solid urethane hydraulic seals and packings. Included are descriptions of chamfered seal lip and manufacturing tolerances. Disogrin Industries, 510 S. Fulton Ave., Mt. Vernon, N. Y.

**25. Heavy-Duty Engine Lathe.** Brochure on LeBlond 4025 NK lathe, designed to handle heavy machining jobs in rolling mills, job shops, ordnance plants, and railroad shops. It is available with hydraulically or manually controlled headstock. R. K. LeBlond Machine Tool Co., Madison at Edwards Road, Cincinnati 8, Ohio.

**26. Tap Selection.** Booklet designed to aid in proper selection of taps, including basic information regarding functions, sizes, styles, and standards. Master chart describes cutting characteristics of various metals and lubricating suggestions. Besly-Welles Corp., South Beloit, Ill.

**27. "Tenths" Plug-Gaging Sets.** Catalog describing "tenths" plug-gaging sets in half-thousandth and thousandth steps. These sets are designed for measuring bored holes in tenths and also in setting standards for comparator, snap gage, and micrometer settings. Deltronic Corp., 929 Baker St., Costa Mesa, Calif.

**28. Die Blocks.** Bulletin 200 on different types of die blocks and hot-work steels for forging operations. Recommended uses and tempers are covered. Information on selecting correct size die block, sinking the impression, setting up the die in the hammer, and re-sinking included. A. Finkl & Sons Co., 2011 N. Southport, Chicago 14, Ill.

**29. Flat Finishers.** Catalog FF-755 covers Hammond flat finishers that carry abrasive belts, wheels, or brushes, either singly, in groups, or in combinations. All six models for work up to 12" are discussed. Hammond Machinery Builders Inc., 1600 Douglas Ave., Kalamazoo, Mich.

**30. Cast Alloy Tools and Strips.** Booklet 6102 covers V-R Tantung, a cast alloy. Covers application and brazing and grinding instructions. Vascoloy-Ramet Corp., Waukegan, Ill.

**31. Tap Leader.** Bulletin D-180 describes a drill and tap holder which permits power feed tapping operations on horizontal- and vertical-spindle machines not equipped with thread leads or not having leads that match those of the tap. Giddings & Lewis Machine Tool Co., Davis division, Fond du Lac, Wis.

# Allison-Campbell

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See Number 29



See Number 30

**32. Automatic Weighing.** Folder details check weighers, weight classifiers, and monitors for under and overfill control, portion, and quality control by weight, and counting and grading by weight. Equipment offers two, three, four, and five channels for refined segregation. Illumitronic Systems Corp., 680 E. Taylor, Sunnyvale, Calif.

**33. Emulsion Type Cleaner.** Flyer on metal cleaner which leaves a film to protect parts from rust during processing and storage. Features include high

solvency, instant mix, and fire resistance. E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

**34. Air-Controlled Equipment.** Bulletin on the Lehigh double-acting air motors, hydraulic units, air cylinders, and drill press feeds. Lehigh Inc., Air Control division, Easton, Pa.

**35. Chemical Processing Compounds.** A 12-page brochure describing cleaning and processing compounds made by Turco Products for the metal finishing industry. Phosphatizing, descaling, and rust removing are discussed. Turco Products, Inc., 24600 S. Main St., Wilmington, Calif.

**36. Hole Punching Units.** A 12-page catalog on Wales Strippit's BN units for punching up to 3½" diameter holes in flanged parts, angles, and sheets up to 10-gage mild steel. Wales Strippit Inc., Akron, N.Y.

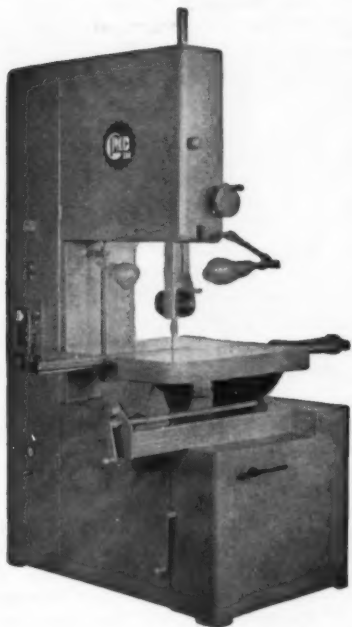
**37. Horn Presses.** A 22-page bulletin on horn presses which are being used in the automotive, container, and appliance industries for horn operations or mounting of special dies to flush of bed. Federal-Warco division, The McKay Machine Co., Warren, Ohio.



# GROB SPELLS THE DIFFERENCE IN BAND SAW MACHINES

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See Number 35

**38. Shaft Knurling Machine.** Bulletin on a knurling machine which handles shafts up to 20" long and  $\frac{5}{8}$ " diameter. Morley Machinery Corp., 3111 Winton Road South, Rochester 23, N.Y.

**39. Sealant.** Bulletin on how to simplify assembly of metal parts with Loctite sealant, a liquid lock for metal parts. Types of applications are discussed, as well as grades of sealant. American Sealants Co., Hartford 11, Conn.

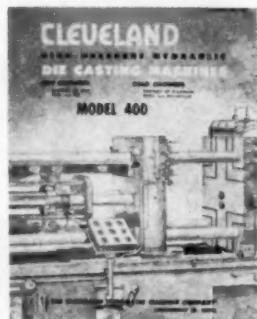
**40. Conversion Chart.** Handy pocket-sized chart for converting time to pieces-per-hour. It gives cycle time for .6 to 60 sec. and then converts it to pieces-per-hour figures ranging from 6000 to 60. Crown Tool, Inc., 810 N. Cass St., Wabash, Ind.



See Number 36

**41. Die-Casting Machine.** Bulletin 461 on a 400-ton die-casting machine available either as a hot chamber for zinc, lead, and tin alloys, or as a cold chamber for aluminum, brass, and magnesium alloys. Cleveland Automatic Machine Co., 3932 Beech St., Cincinnati 12, Ohio.

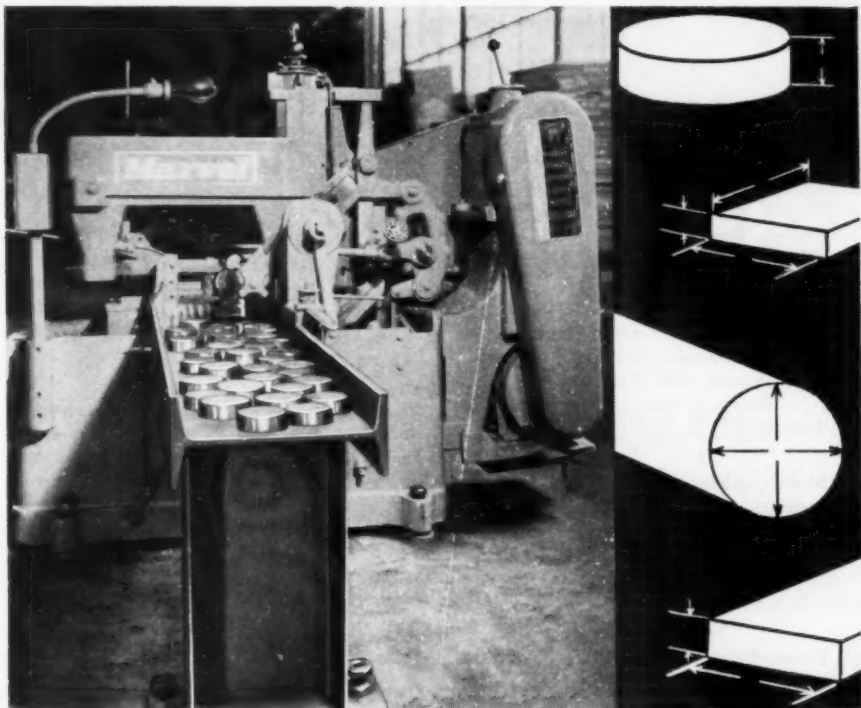
**42. Tool Steel Trends.** This first issue of a new publication contains information on tool steels, including material selection and production practices such as heat treatment, fabrication, grinding, and shaping. Committee of Tool Steel Producers, American Iron and Steel Institute, 150 E. 42nd St., New York 17, New York.



See Number 41

**43. Sulphurized Base.** Bulletin on a sulphurized base that offers high film strength and lubricity for deep-hole tapping and similar operations on stringly alloys. The base is recommended as a blend in mineral oil to make a more effective cutting lubricant. Baker/Gubbins Co., 1448 Wabash Ave., Detroit 16, Mich.

**44. Adjustable Riser Block.** Bulletin on a riser block that features sixteen leaves that are adjustable in steps of .125". This accessory can be used on drill and punch presses, milling machines,



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A hack saw blade, like any other cutting tool, must be rigidly held (tensioned) if it is to cut-off accurately. Also, the point at which tension is applied is important to accurate work. Two reasons why Marvel High-Speed-Edge Hack Saw Blades can make any hack sawing machine cut-off more accurately are:

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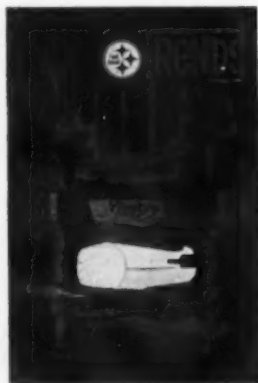
surface grinders, shapers, and planers. B & S Machinery & Supply Co., 1660 Collamer Ave., Cleveland 10, Ohio.

**45. Drill-Press Tray.** Data sheet on a machine tray that has sloped flanges and will fit all drill-press columns. This tray, which comes ready to install, will hold a full set of drills. Arrow Machinists and Fabricators, 154 E. 3rd St., Mt Vernon, N.Y.

**46. Thread Gage.** Flyer on a thread gage which measures the pitch diameter of any screw without interfering with the root or bottom flat. R-K Development Corp., 171 S. Daisy Ave., Pasadena, California.

**47. Metalworking, Material-Handling Equipment.** A 12-page brochure introducing more than 3800 types and models of metalworking and material-handling equipment. Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, Ill.

**48. Three-Phase Rectifier Arc Welders.** Bulletin describes performance features and construction details of welding machines that are designed to handle any type of manual arc welding electrode. Lincoln Electric Co., Cleveland 17, Ohio.



See Number 42



See Number 49

**49. Salt Baths.** An easy-to-use reference data bulletin on salt baths and chemicals for use in neutral hardening, tempering, austempering-martempering, carburizing, annealing, high-speed quenching, and nitriding. A bath recommendation guide for SAE steels and a Fahrenheit-to-Centigrade conversion table included. A. F. Holden Co., 14341 Schaefer Hwy., Detroit 27, Mich.

**50. Drill-Press Table.** Flyer describing an "all purpose" drill-press table that permits drilling, milling, grinding, and indexing without removing the work from the table. Palmgren Steel Products, 8383 S. Chicago Ave., Chicago 17, Illinois.

**51. Universal Hand Tapping Machine.** A data sheet describing a universal hand tapping machine designed to allow the operator to swing the tap to any point on or off the table in the case of large parts that overhang. Toolroom Equipment division, The Product Machine Co., 990 Housatonic Ave., Bridgeport 1, Connecticut.

**52. Apex Optical Comparator.** Flyer on a portable optical comparator that can be used in normal room illumination. Rankin Bros. Engr. & Sales, Inc., 11090 S. Alameda St., Lynwood, Calif.

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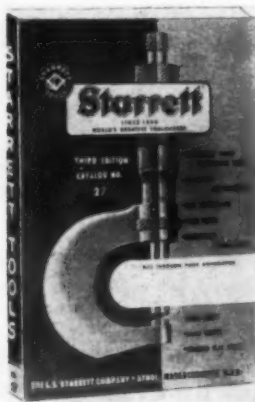
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**53. "Keeps Parts Rust Free."** Folder F-SI-61 describes metal protective coating for indoor rust prevention that is available in aerosol cans for fast application. The White & Bagley Co., 99 Foster St., Worcester, Mass.

**54. Decimal Equivalent Chart.** This shop aid is designed for quick conversion of Birmingham wire gages and fractions to decimals. Gages from 36 to 1 and fractions from 1/64 to 63/64" are shown. Ohio Seamless Tube division, Copperweld Steel Co., Shelby, Ohio.



See Number 59

**55. Tap Extractors.** Flyer on twenty-two tap extractors designed to fit taps for helical coil wire screw thread inserts. The Walton Co., P.O. Box 5, Elmwood Branch, Hartford 10, Conn.

**56. Clamping and Tooling Components.** Catalog 31D on Northwestern's clamping and tooling components available from stock. Includes quick-setting knobs and inserts, black penetrate and cadmium plate noses, insert locking nuts, and swing "C" washers. Northwestern Tools, Inc., 117 Hollier Ave., Dayton 3, Ohio.

**57. Production Tools.** Catalog on soft chuck jaw blanks; alloy studs; nuts and

washers; drilling, milling, and jig vises; coolant pumping systems; and filtered cleaning systems. Morton Tool Co., 6625 S. River Road, Marine City, Mich.

**58. Packaging, Loading Steel Mill Products.** Bulletin R247-52 on preferred methods for packaging, marking, and loading of steel mill products for domestic shipment. Commodity Standards Division, U.S. Department of Commerce, Washington 25, D.C.

**59. Starrett Tools.** A 480-page catalog showing more than 3500 items manufactured by Starrett. Mechanics' hand measuring tools and precision instruments, dial indicators and gages, hacksaws, hole saws, band knives, and ground flat stock included. The L. S. Starrett Co., Athol, Mass.

**60. Iron Mike.** Brochure describes a detachable, reusable fitting for high-pressure hose assemblies designed for use with Aeroquip 1509 multiple wire braid hoses. Aeroquip Corp., Western division, 3015 Winona Ave., Burbank, California.

**61. Full-Floating and Flange-Type Holders.** This 4-page bulletin describes the full-floating tool holders and flange adjustable holders made by Erickson. The floating model features firm reamer grip, while the flanged type is locked in place with no float. Erickson Tool Co., 34350 Solon Road, Solon, Ohio.

**62. Anti-friction Arbor Support Bearings.** Bulletin AB 61-2 on ball-type anti-friction arbor support bearing. Advantages include replacement and maintenance cost savings, and elimination of cutter chatter. Briney Mfg. Co., P.O. Box 208, Pontiac, Mich.

**63. Press Control System.** Bulletin describing the Di-Matic system for preventing damage to dies on power presses, transfer machines, and other automatic equipment. The electrically



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peratures are given along with the steel's analysis and AISI number. A list of typical applications together with suggested working hardnesses serves as an additional check on your use of the steel.

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controlled system disengages the press clutch in the event of a failure. Di-Matic Controls, Inc., 100 Beadel St., Brooklyn 22, N.Y.

**64. Universal Collet Fixture.** Flyer on collet fixture for drilling, boring, tapping, threading, milling, grinding, and fitting operations. The Fischer Specialties, 1320 W. Raspberry St., Bethlehem, Pennsylvania.

**65. Plastic Tool System.** Two bulletins on a system for creating laminated tools that retain strength in continuous operations at high temperatures (350°F). Bulletin 22E describes an epoxy laminating resin; bulletin 22F, a surface coat epoxy. Smooth-On Mfg. Co., 570 Communipaw Ave., Jersey City 4, N.J.

**66. Mechanical Counter.** Bulletin on a heavy-duty mechanical counter, called

"Visicounter," designed for remote and difficult-to-see locations. Veeder-Root Inc., 70 Sargeant St., Hartford 2, Conn.

**67. Screw Threads and Tap Drill Sizes.** Wall chart showing decimal equivalents, screw threads and tap drill sizes, designed to serve as an aid in office, shop, and laboratory. Ash & Co., 5100R Grand River, Detroit 8, Mich.

**68. Assembly Containers and Mounting Accessories.** Catalog on G. B. Lewis's Plastibox assembly containers and mounting accessories for production, line feed, and storage of small parts. G. B. Lewis Co., Watertown, Wis.

**69. Safety Positioner.** Flyer on an adjustable safety positioner for use as a one-piece safety block for rapid and secure snubbing of power presses during die servicing and maintenance operations. Duff-Norton Co., Four Gateway Center, Pittsburgh 22, Pa.

**70. Worm Gear Jacks.** A 28-page catalog on worm gear jacks for leveling, adjusting, and stabilizing machinery and equipment. Contains information on the 2, 5, 10, 15, and 25-ton capacity models. The Joyce-Cridland Co., 2027 E. 1st St., Dayton 3, Ohio.

**71. Tool Post.** Flyer on a quick-change tool post for use on any type and size of lathe. It consists of a square block mounted and clamped by a bolt and nut in place of the usual tool holder. Amitool Co., 629 Main St., Westbury, New York.

**72. Protective Coating.** Bulletin on a modified epoxy coating that is available in 20 basic colors plus clear which can intermix to produce any desired shade. Tuffy Products, Inc., 1200 Mendelssohn Ave., North, Minneapolis 27, Minn.



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## Book Reviews



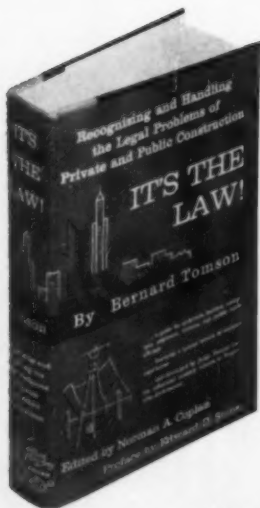
### RARE METALS HANDBOOK

(Edited by Clifford A. Hampel, 715 pages. \$20.00)

A revised, expanded, and up-to-date volume on rare metals that provides engineering information on many important structural materials. Compiled by 44 experts, this handbook presents the full range of currently available data on 55 of the less-common metals.

The book presents recently declassified material on plutonium and the rare earth metals, along with discussions of cesium, chromium, rubidium, scandium and yttrium, as well as columbium and tantalum. Properties and comparisons between metals are shown in convenient tabular form wherever possible, and complete reference lists close every chapter.

The Book Shelf, Hitchcock Publishing Co., Wheaton, Ill.



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(By Bernard Tomson. 436 pages. \$7.50)

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subjects which Judge Tomson gives major attention.

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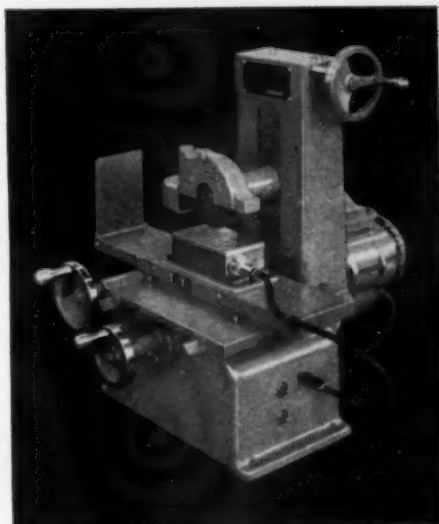
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Table travel—8", traverse 4".  
Vertical head movement—6".  
Work area under 4" wheel—6"; with chuck—4".  
Standard grinding wheel—4" x 3/8" x 1/2".  
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Motor, 1/4 HP, single or 3 ph., dynamically balanced.  
Dimensions—20" x 24" x 22 1/2" high.  
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## **ENGINEERED CASTINGS—How to Use, Make, Design, and Buy Them**

(By Glenn J. Cook, 257 pages. \$8.50)

Here is fundamental technical information in simple form to aid in getting best industrial results in the design, application, and purchase of engineered castings. The book covers many aspects of the field, such as various types of castings and how they are made; selection of metals; design factors; and purchasing standards and procedures, including much that will also be helpful to readers interested in the sale of castings.

Advances in the industry are reported in detail. Clear discussions are provided of new techniques in investment shell processes and induction stirring in arc furnaces. Also given are methods for the treatment of metals, shell molding, and ductile (nodular) irons.

To help in meeting the requirements of specific projects, full discussions are provided on how to select the proper metal for the casting. Included are such features as economic considerations, de-

sign considerations, physical properties, the importance of compressive strength, and heat treatments utilized in gray iron, malleable iron, steel, vacuum-treated metals, nonferrous metals, and other materials.

For the buyer of engineering castings, the volume offers sound procedures for selecting a foundry, obtaining quotations and ordering castings, and setting up a contract. Also provided is concise information on how to buy patterns. In addition, the book surveys improved methods of buying and selling, together with common perils and pitfalls for the man selecting a supplier.

Also included is a discussion of four basic requirements that must be met before a contract for castings can be signed. Good buying practices are given support by a case study showing the results of ineffective pattern buying.

**The Book Shelf**, Hitchcock Publishing Co., Wheaton, Illinois.

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## **TOOL STEEL SIMPLIFIED**

(By Frank R. Palmer and George V. Luerssen. 595 pages. \$2.50)

This is a completely revised edition on tool steel for the man who makes tools and dies. The authors, both men of The Carpenter Steel Co., have begun with getting the reader acquainted with tool steel. The book goes into terms, and steel analysis, character, and soundness. Steel selection and properties are amply covered.

Part 4 goes into the relation of design to heat treatment, hot acid etch testing, and other forms of steel testing. Quenching and tempering, as well as furnace atmospheres, are also covered.

This book is addressed to the men in industry who are responsible for the design, making, or heat treating of tools.

In this group have been included not only tool supervisors, foremen and the men actually engaged in the work, but also apprentices and the students in trade and engineering school who will some day inherit the responsibilities of the tool room. Its purpose is to present simplified methods for selecting and heat treating the proper tool steel to make any kind of tool.

Author Frank Palmer is chairman of the board at Carpenter. He has a background in the manufacture, use, and heat treatment of tool steel. His co-author, George Luerssen is retired vice-president of metallurgy at Carpenter. He has over 45 years of practical experience in the applications of tool steel.

**The Book Shelf**, Hitchcock Publishing Co., Wheaton, Illinois.



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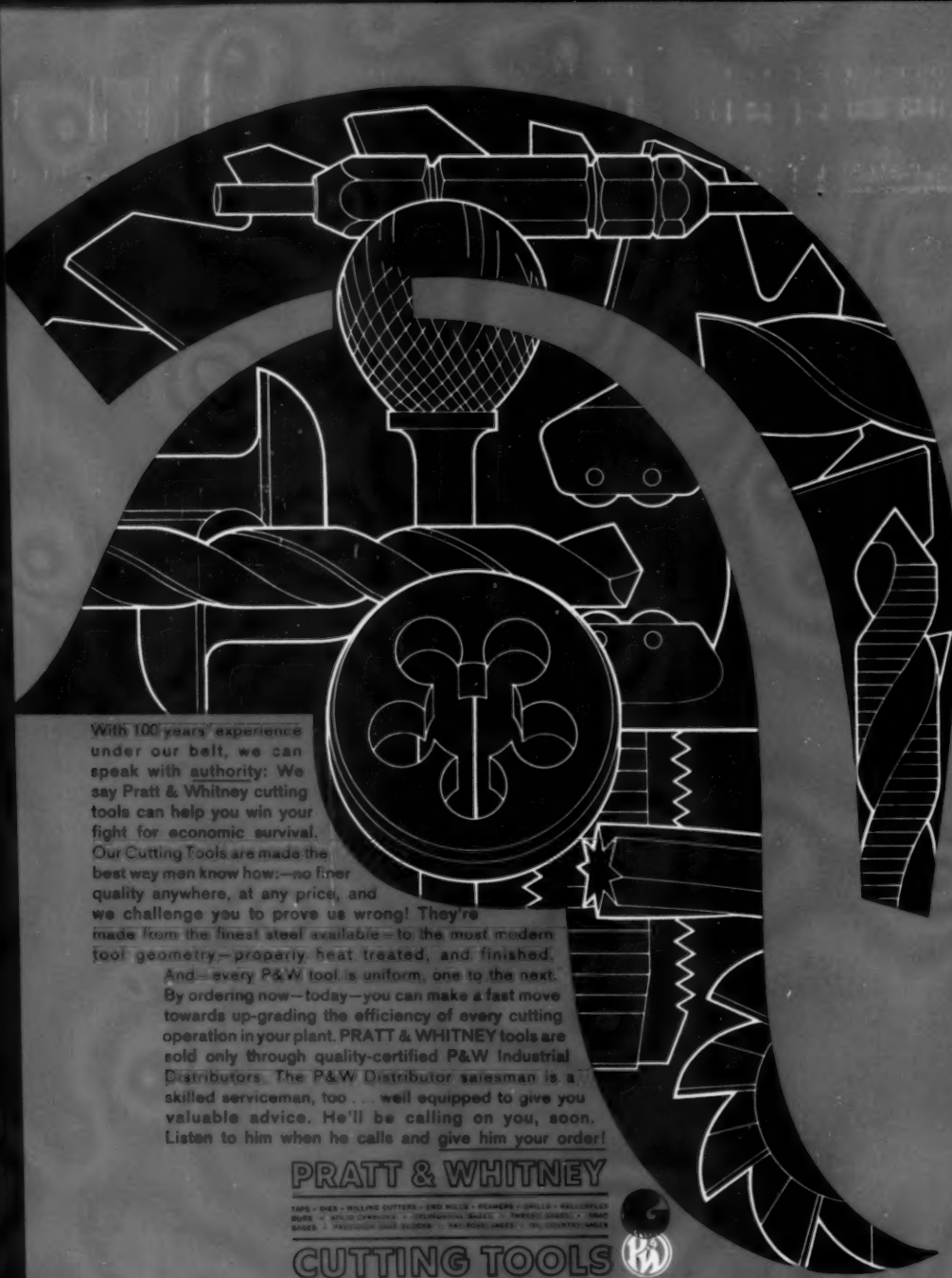
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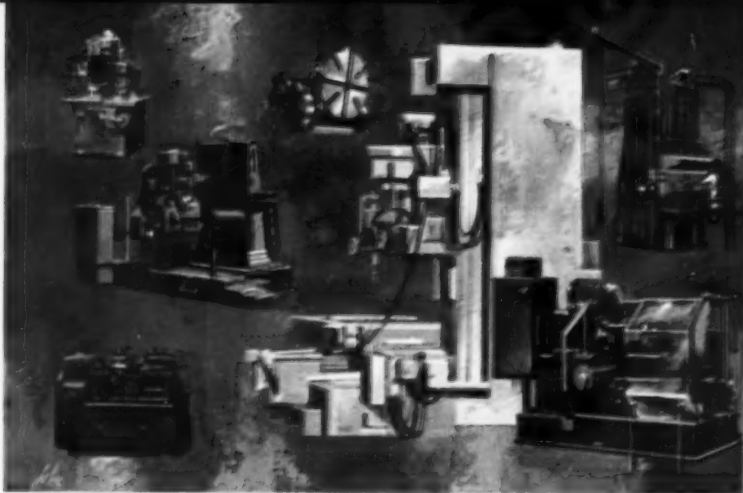
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BURS • SPIND CHAMFERS • INTERNAL TAPS • THREADED INSERTS • SHAPING  
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## CUTTING TOOLS



#### P&W MACHINE TOOLS

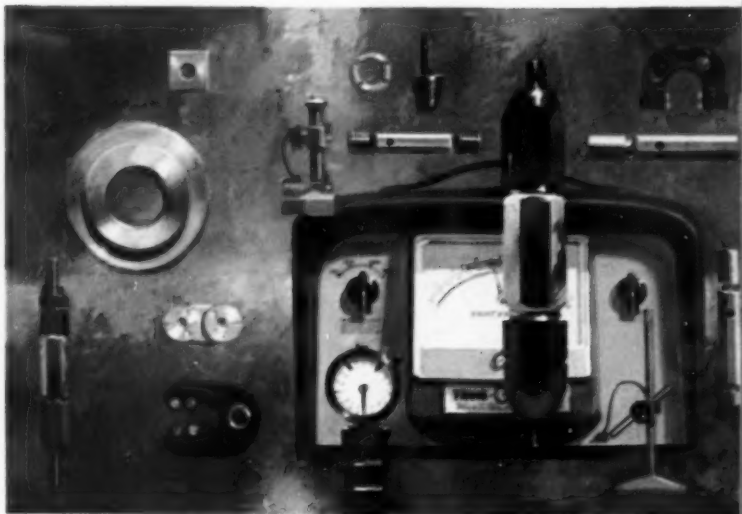
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More than ever, production efficiency depends on fast, precise, economical gaging. P&W supplies all types of gaging equipment. Thus, you can choose those that do your job at lowest cost... from simple CONVENTIONAL GAGES to the most intricate tape-controlled INSTRUMENT GAGES. Types include PLUG, RING, THREAD and SNAP GAGES, INTERNAL and EXTERNAL COMPARATORS, and PRECISION GAGE BLOCKS... all available through selected Industrial Distributors. The exclusive series of AIR-O-LIMIT,\* TRANS-O-LIMIT\* and DATA-LIMIT\* gages and famous "FLYING MIKE" CONTINUOUS GAGE are available from your P&W representative. Bring your gaging problems to him.



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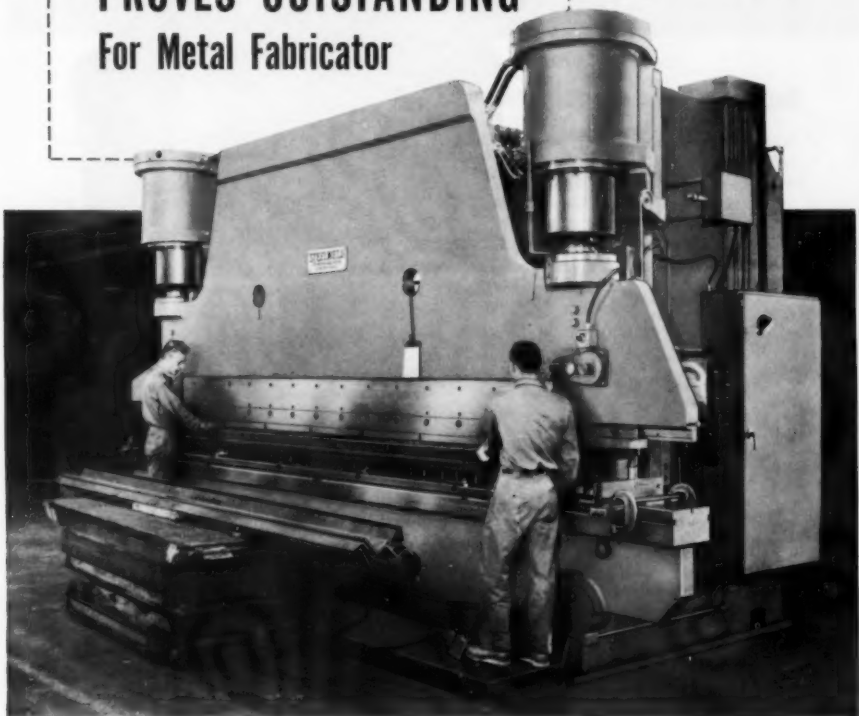
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# Hydraulic Press Brake PROVES OUTSTANDING For Metal Fabricator

Model MH16-14 Steelweld  
Hydraulic Press Brake.  
Overall bed and ram length  
20'-0". Capacity 650 tons.



A 650 ton Steelweld Hydraulic Press Brake is a mighty important tool at The Bargar Metal Fabricating Co., Cleveland. It performs a wide range of operations such as bending, forming, stamping, punching, drawing.

The brake is especially good for bending large plates, because the ram can be traveled at exactly the right speed to prevent whipping of the plate. Sometimes plates as large as 10' x 20' x 1/4" are bent.

The machine is very useful for drawing operations, excelling mechanical press brakes for this work, because it can be operated at the speed that is most suitable for the metal. Also, the ram can be traveled through a greater distance because of the unusually long 16-inch stroke. The power is constant for the entire stroke.

Much punching is done with the Steelweld, and this work is speeded by adjusting the ram stroke to travel

only slightly more than the thickness of the plate. The fact that the ram can be inched to the work and backed away whenever desired is another time-saving feature especially helpful when setting up dies.

The Bargar Company has one of the finest and most completely equipped sheet metal fabricating plants in Cleveland. The Steelweld Brake is a good example of their modern production facilities.

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Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

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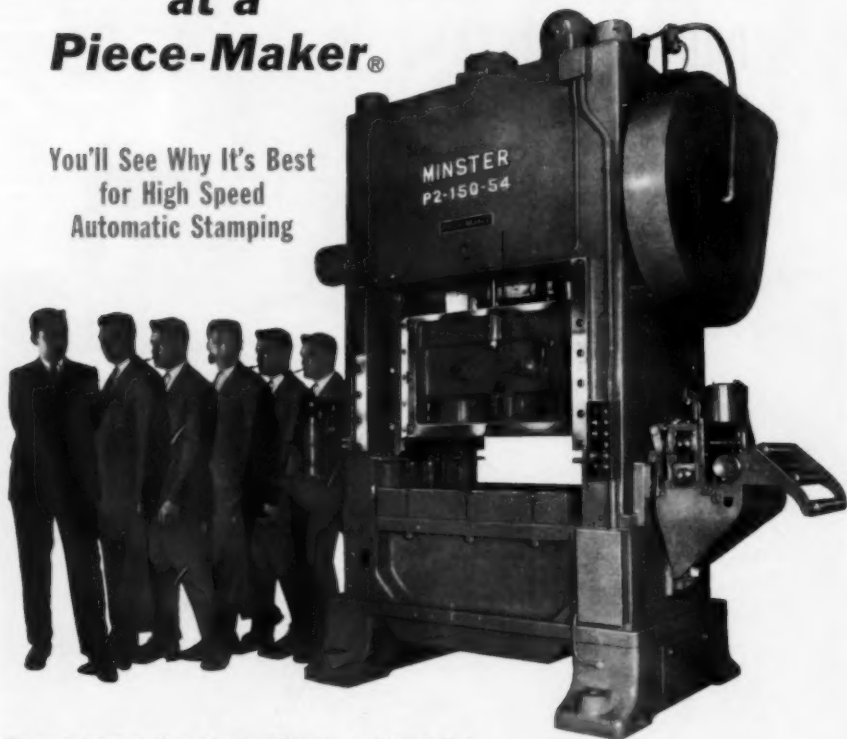
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August, 1961

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# Take a Close Look at a Piece-Maker®

You'll See Why It's Best  
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Automatic Stamping



The superior strengths and values that give a Minster Piece-Maker press the most precision and the best stability for high speed automatic stamping jobs are "hidden" in the Minster design and construction.

That's why it is important to you, when evaluating press equipment for progressive die operation, to carefully compare frame structure, precision of bearing and gib fitting, slide to bed parallelism, eccentric shaft support, lubrication system and control and clutch efficiency. Every size Piece-Maker, 20 through 300 tons, has this superiority. Ask a Minster representative to show you *exactly* why this is true.

The Minster Machine Company, Minster, Ohio

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MACHINE and TOOL BLUE BOOK

# Don't gamble on lathe work!

*Get cost-reducing HYDRASHIFT to insure profits  
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With a Cincinnati HYDRASHIFT, your man can out-produce any other lathe operator!\* That's because he keeps the machine cutting full time. He loses no speed-changing time! And, because it's easy to change speeds, he'll use the best RPM for every operation.

HYDRASHIFT is the only economy-priced geared head lathe with Power Dial speed

shifting! The next desired spindle speed is dialed while the lathe is cutting. At the end of the cut, hydraulic power shifts the speed without the operator leaving the apron.

In addition, HYDRASHIFT has all the other Cincinnati features for speed, accuracy and ruggedness that make it the "most-wanted" lathe in its class!



*Ask your Cincinnati Lathe and Tool Distributor for Catalog T-230, or write us direct.*

## **CINCINNATI LATHE AND TOOL CO.**

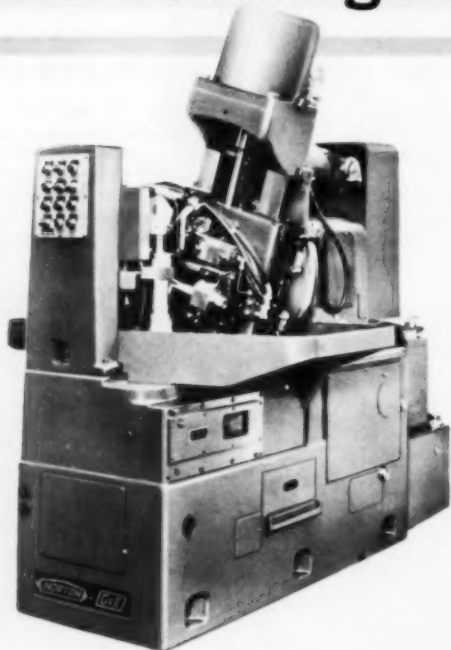
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HYDRASHIFT Lathes / CINCINNATI Drilling Machines / SPIROPOINT Drill Sharpener  
CINTIMATIC Numerically Controlled Lathes and Drills



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Here's how the Norton **G&E**  
10 HQ HOBlique Universal Gear Hobber  
...cuts helical gears fast



It took entirely new design and construction to establish two-way leadership for the Norton-G&E 10 HQ HOBlique — as a truly universal gear hobber and as a greatly simplified machine.

*The HOBlique is universal* not only because it produces both helical and spur gears, but because it can produce them to meet two different requirements — with commercial accuracy for immediate use, or ready for shaving when required for critical applications.

*The HOBlique is so simplified* that it provides shorter, faster hob travel, cuts helical gears at spur gear rates, and is much easier to operate. The oblique feed eliminates the need for lead screw, feed change gears, lead change gears, differential mechanism, lead

cam or guides. Feeds are hydraulically operated, infinitely variable, easily preselected by simple dial control. Hob speeds are infinitely variable by dial control.\* The angularly adjustable swivel head is easily and quickly set for any helix angle. Minimum hob cost results from distribution of cutting action over entire hob length.

*Capacities are:* 10" maximum diameter, 5 DP maximum pitch rating, 6" face capacity, and 45 helix angle.

Get more facts on how the NORTON-G&E 10 HQ HOBlique Gear Hobber can benefit your production. See your G&E Distributor, or write to NORTON COMPANY, G&E Division, Worcester 6, Massachusetts.

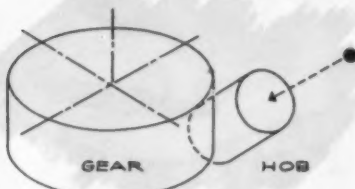
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NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Retractors • Non-Slip Floors — BENCHMANNING DIVISION: Coated Abrasives • Shrapnel Slides • Pressure Sensitive Tapes

# ...at spur gear rates

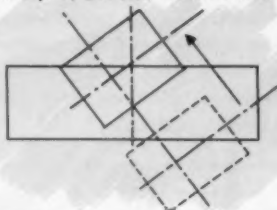
## *HOBlique highlights for faster, lower-cost gear hobbing*

**Duolineal Cycle Reduces Hobbing Time**

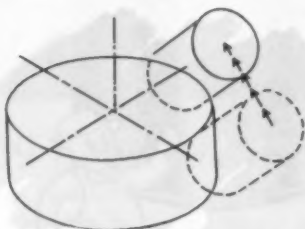


Infeed plunge to correct depth.

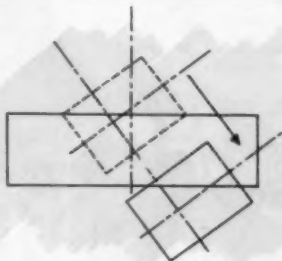
**Rectacycle† Cuts Hob Travel To Minimum**



Climb feeds at fast enter rate followed by oblique cut.

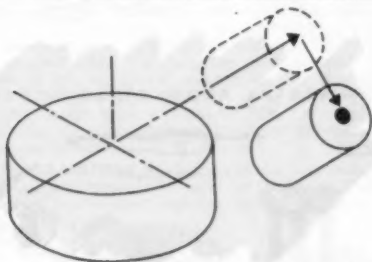


Oblique climb feed to end of cut.



Hob returns rapidly to starting position.

†Additional at extra cost.



Withdrawal of hob and return to reloading position.



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August, 1961

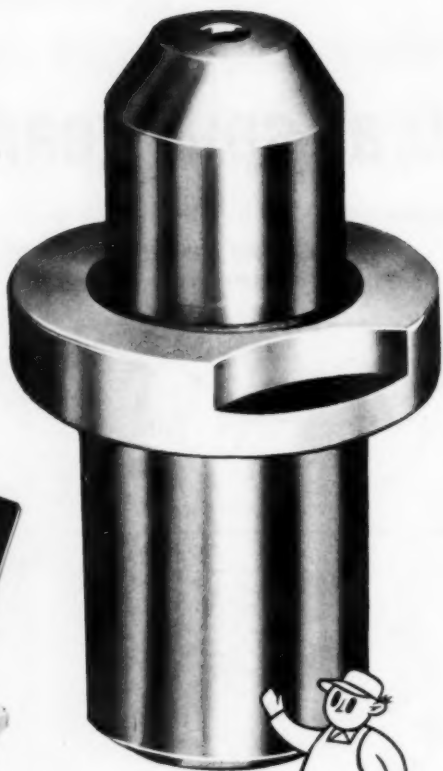
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Universal Locating Pins assure quick, accurate locating throughout even the longest production runs. They're hardened and ground to extremely close tolerances . . . precision made to give long service life for much less than the cost of ordinary tool-room pins.

Press fit, threaded or lock-screw types, round or relieved, are stocked in all standard sizes for immediate delivery. Write for catalog detailing locating pins plus other Universal production tools.



Lock Screw Pin



Relieved Press-Fit Pin



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Standard Collet Chuck



Mikro-Lok Boring Bar



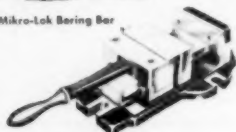
Boring Chuck



"Kwik-Switch"  
Tool Holder

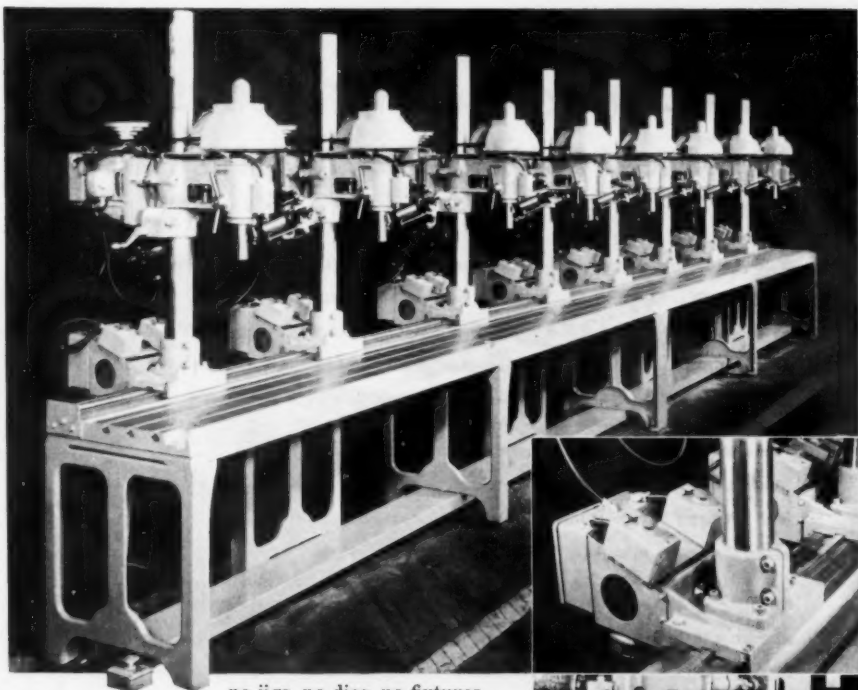


Standard Drill Bushing



Wedge-Lock  
Production Vise

**UNIVERSAL ENGINEERING COMPANY, FRANKENMUTH 10, MICHIGAN**



no jigs, no dies, no fixtures...

## 29 holes at the touch of a switch!

Production drilling engineered by 'Buffalo'

**PROBLEM:** Drilling as many as 8 sets of holes in straight sections of aluminum channels to be formed into door and window frames, with varying hole patterns at exact locations to fit hardware and cross members of different size frames.

**SOLUTION:** A specially engineered 8-spindle 'Buffalo' No. 18 Drilling Machine with air-operated spindles and gear motor-positioned spindles mounted on 28-ft. T-slotted and dovetailed table. Two jogging push buttons on each head move it left or right to nearest  $\frac{1}{16}$ " by stainless steel scale and indicators. Thus heads may be set up quickly for any pattern with holes as close as  $12\frac{1}{4}$ ". A single foot switch actuates all spindles simultaneously, though any air feeds may be locked out.

**CONCLUSION:** For fast, accurate, flexible drilling, there's a 'Buffalo' machine quality-built for the job, or 'Buffalo' can engineer one to your exact specifications. Let us know your problem!



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Buffalo, New York  
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.



'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.



'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.



Squire Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

## **NOW...A Larger Capacity FELLOWS-PFAUTER High-Speed Hobbing Machine...The P 630**

**You get all the advanced-design features of the production-proved P 400 Fellows-Pfauter hobbing machine — plus extra work capacity — with the new Model P 630. Takes work up to a diameter of 25". Maximum face width at 25" diameter is 16¼". Maximum diametral pitch in steel is 3. It's fast, easy-to-handle . . . and it's built for high production.**

**For example: Work area is readily accessible for setup and loading. Table retracts automatically from hob to facilitate work changes. Hob shifting is controlled by pushbutton. And built-in hydraulics assure smooth operation of tallstock and fixtures.**

**Solid construction features include: rugged hob head and double wall construction column and bed, with heavy V-ways. Table is as large as maximum workpiece diameter, and index worm gear nearly as large as work table. Work column is of massive design.**

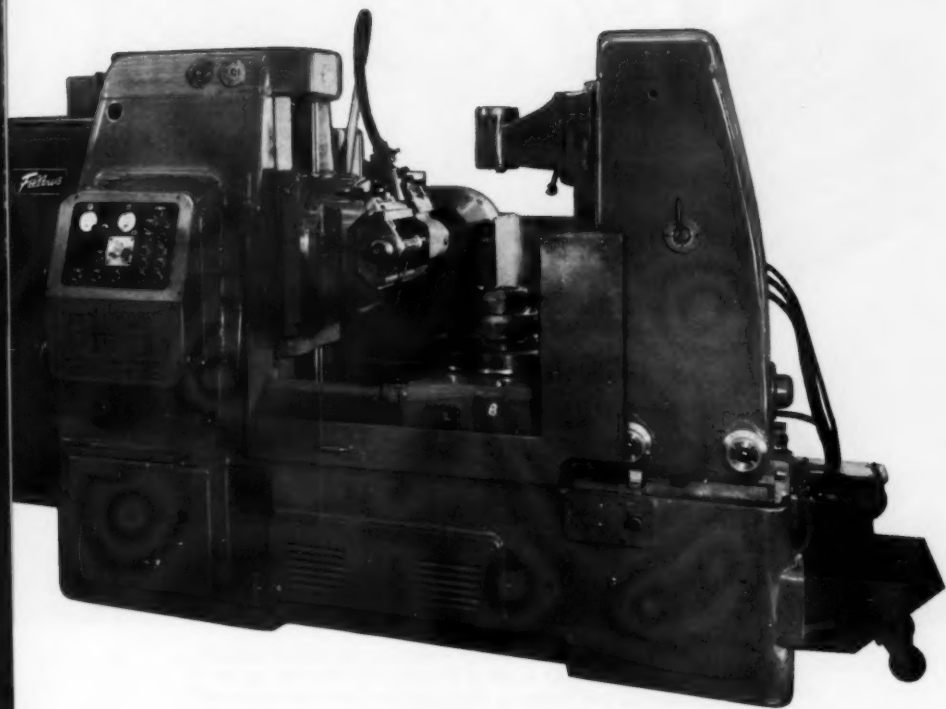
**Reduce your production costs with this new Fellows-Pfauter. Get complete details now.**



### **NEW . . . Dictionary of Change-Gear Combinations**

**Eliminate tedious calculations and trial-and-error methods for finding change gear combinations. Now, simply look them up like words in a dictionary in "Fellows-Pfauter Change Gear Tables" by F. Becher**

**and A. Koerner. This English edition contains combinations for more than 26,000 ratios carried to six decimal places from .100,000 to 1,000,000, with the greatest step approximately .00005. Change gears in the range of 18 to 80 teeth are mainly used. Examples of applications are given. Only \$8.00. Get a copy now. Send your order to THE FELLOWS GEAR SHAPER COMPANY, 78 River Street, Springfield, Vermont, U. S. A.**



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FASTEST,  
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New Strippit Quick-Change Holder with Micro-Set Gaging System for use on any 15-A, 10-AA or 10-A Strippit Fabricator, with jig bored Micro-Bars and Dial Indicators, allows gage settings to the nearest .001" in seconds. Guess work eliminated in close tolerance gaging—spring loaded Dial Indicators provide sensitivity and "feel" in settings. No need for special gages or jo-blocks. Use quick-reading built-in scales when close tolerance gage settings are not required.

This new system, now available on all new Strippit 15-A Fabricators, also quickly adapts to all existing 15-A, 10-AA and 10-A Fabricators. Let your Strippit Tool & Methods Engineer arrange to demonstrate this new Micro-Set Gaging System to you. Or write for Catalog MS.

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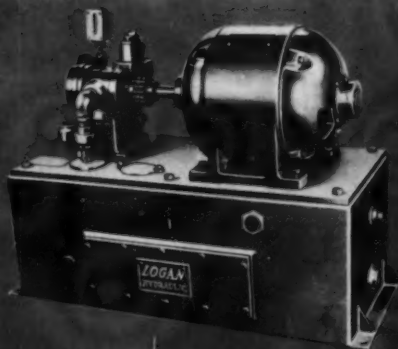
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MACHINE and TOOL BLUE BOOK



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This husky self-contained power unit combines true economy with tremendous efficiency to power cylinders, chucks, clamping devices and many other hydraulic machines.

Teamed up with Logan's "Super-matic" cylinder, this unit can generate thousands of pounds of pressure and maintain a steady, trouble-free operation month after month—at top produc-

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# PQA\* proves it



This Allen screw passes  
multi-million-cycle test  
under high load conditions



BAKELITE MOUNT

PHOTOMICROGRAPH OF COMPETITIVE CAP SCREW THREAD

50X Magnification—unretouched

Here you see a competitive socket-head cap screw where thread laps and deep decarburization (lighter area running through roots of threads) caused premature failure of the screw. When used under high load conditions in an outboard crankshaft-connecting rod-piston assembly, such a screw failure would cause great motor damage.



BAKELITE MOUNT

PHOTOMICROGRAPH OF ALLEN CAP SCREW THREAD

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Now look at this Allen Socket Cap Screw. Photo was taken during regular quality control test and shows no thread lap or decarburization. Allen is producing to and inspecting in accordance with MIL-B-7838A for thread discontinuities—your assurance of quality!

## \*PRODUCT QUALITY ASSURANCE

PQA is the symbol of unquestioned quality at Allen. It stands for *constant* quality control from rigid upgrading of incoming raw materials to shipment of finished products—*plus* an unconditional guarantee that backs up every order!

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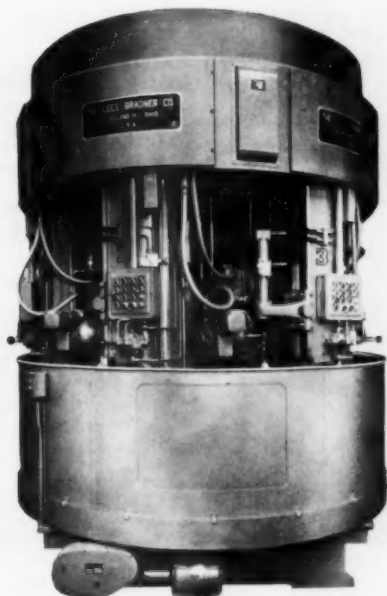


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but, with its pushbutton controls and automatic features, actually controls the operator thus reducing the chance for human error or slow-down. Chips and coolant are easily carried away from the headstock by the elimination of flat surfaces.

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*New 7HD HOB HEAD with  
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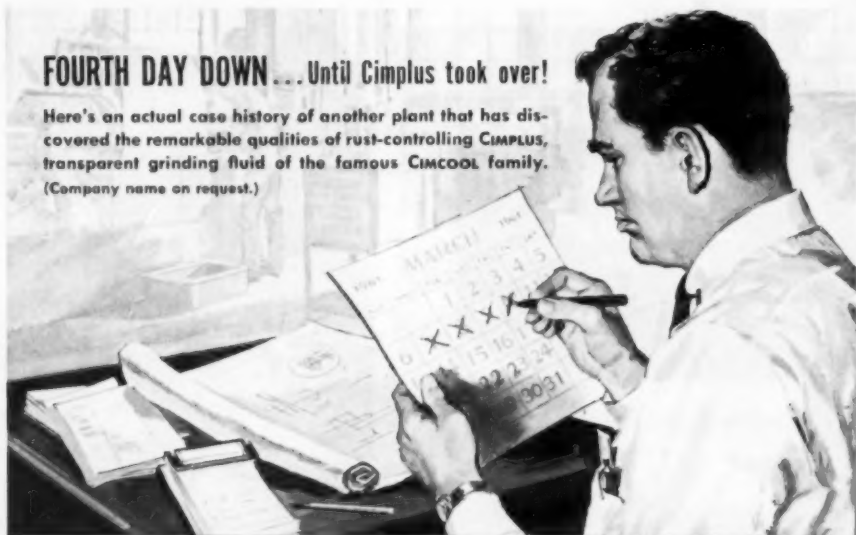
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Here's an actual case history of another plant that has discovered the remarkable qualities of rust-controlling CIMPLUS, transparent grinding fluid of the famous CIMCOOL family. (Company name on request.)



### FIELD SERVICE REPORT

The job was grinding cast iron machine tool parts on three rotary surface grinders with an 1800 gallon central cutting fluid system.

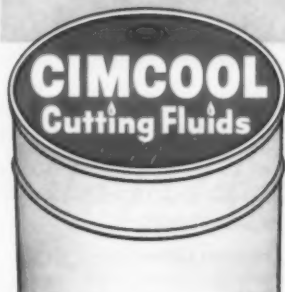
The coolant they had been using had let the sludge cake up and clog up the lines and they had been shut down for four days. Then we installed Cimplus at 100 to 1 dilution and the problem was solved.

Since Cimplus took over, they've had no sludge trouble at all. The swarf and grit settles nicely for them, but it doesn't cake. They're also real pleased with the rust prevention on the cast iron parts that Cimplus gives them.

*Kent Reece*

N. Y. Office

Page 2



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**CIMPERIAL\*** — Newest in the famous, industry-proven line of Cimcool® Cutting Fluids.  
**CIMPLUS** — The transparent grinding fluid which provides exceptional rust control.  
**CIMCUT Concentrates (AA, NC, SS)** — For every job requiring an oil-base cutting fluid.  
**ALSO — CIMCOOL Topping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.**

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

\*Trade Marks Reg. U. S. Pat. Off.

# NEW... MASTER COMPARATOR

MODEL / 136B-2



The best thing about this high-precision electronic Comparator is its accuracy and operating convenience. The next best thing is its amazingly modest price\*!

The model 136B-2 measures any master ring from .040" to 4.760" and any master disc up to 3.500" with repetitive accuracy to within two millionths of an inch! It measures with constant force, frictionless response, requires no warm-up.

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This is only part of the story. Send for full details.

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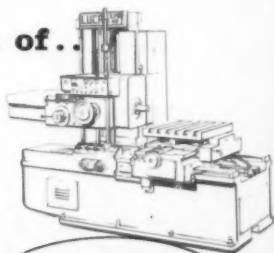
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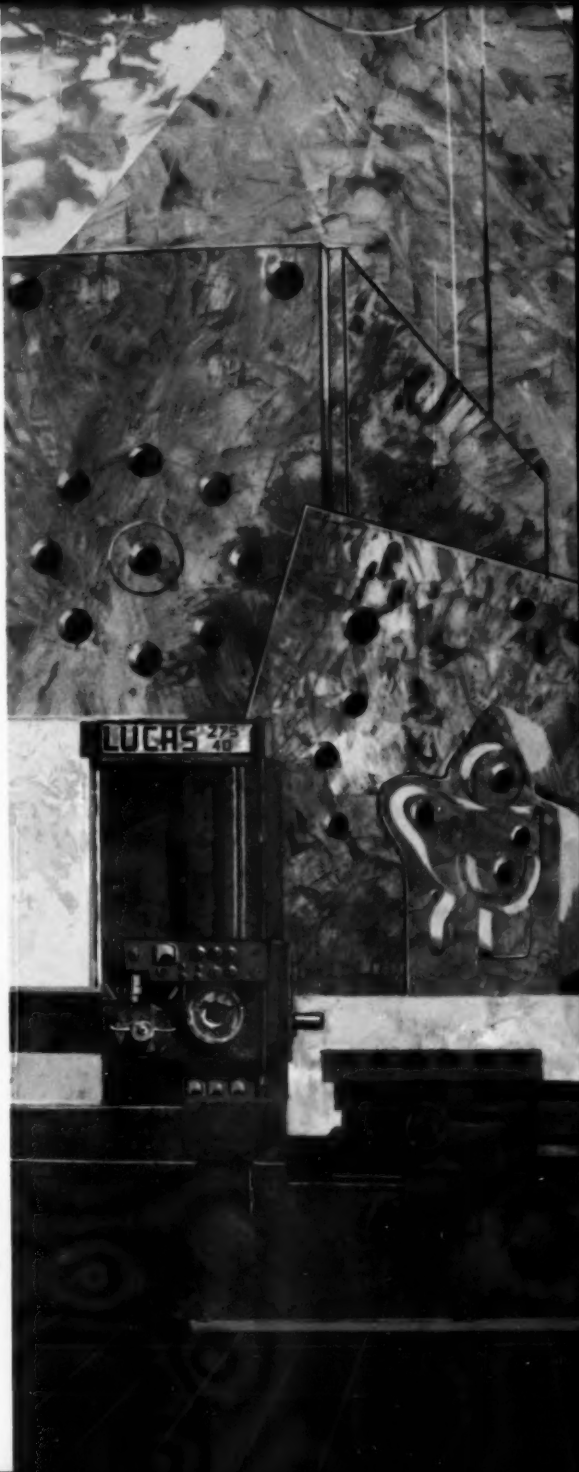
**Small size**

The new Model 275-40 presents every famous Lucas feature, including saddle feed, compacted into a 2 $\frac{3}{4}$ " spindle machine specially suited for small, precision work. Any way you look at it, this new Lucas has the size and the machining versatility to fit into your shop or tool room setup. It's a truly profitable machine because it has so much and does so much. You get a built-in rotary table, tape programming if you want it, extreme accuracy for close tolerance machining and on-machine inspection, a new simplified control system, and many other features. Your Lucas representative can give you the whole story and arrange a demonstration right at the Lucas plant if you wish. Contact him or write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of precision machining small, intricate pieces...

**think of...**



**LUCAS**  
PRECISION

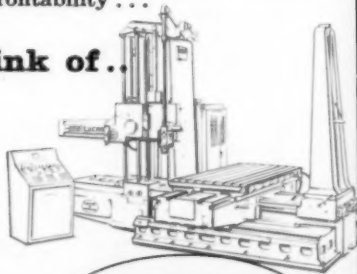


## When you think of PROFITABILITY

... think of Lucas and tape. They're made for each other. Here's why. The Lucas machine can do more horizontal boring, drilling and milling work better than any other machine on the market. Couple this basic efficiency of a Lucas with the cost savings and reliability of tape control and you have an unbeatable combination for profitable work of the highest precision.

Lucas has applied numerical controls to its full range of boring, drilling and milling machines for a number of years. The various combinations of controls available have all been successfully applied by some of the most knowledgeable metalworking firms in the country. Your Lucas representative can discuss in detail some very interesting case histories and arrange a demonstration for you. Contact him or write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of profitability...

think of..



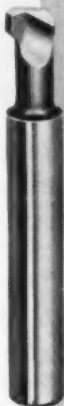
**LUCAS**  
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# SPECIAL JOBS with STANDARD TOOLS

## Thread Recessing

Bokum produces standard tools designed to give perfect threads in blind holes. These tools allow a run over with your threading tool or tap in production to help insure a perfect thread to the full depth of the hole. Most thread sizes are available. Write for Catalog T-R.

TR-3



## Back Chamfering

Here's another Bokum standard recessing tool. When you back chamfer a finished bore, you get a cleaner and easier cut off without a burr on the finished bored end of the part. Bokum produces these tools to conform to standard screw machine tool holder sizes. Write for Catalog B-CH.

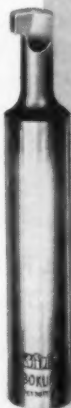
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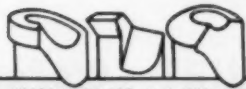
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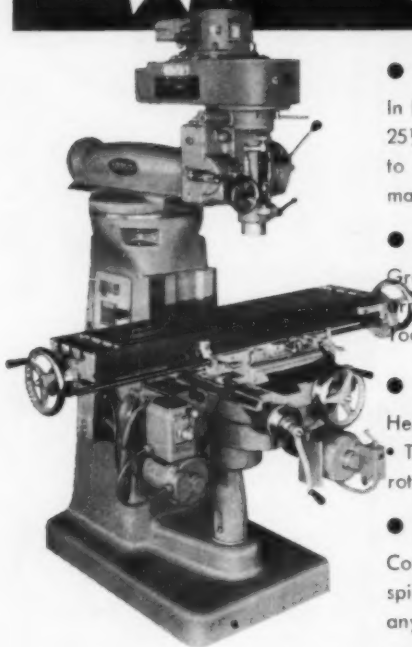
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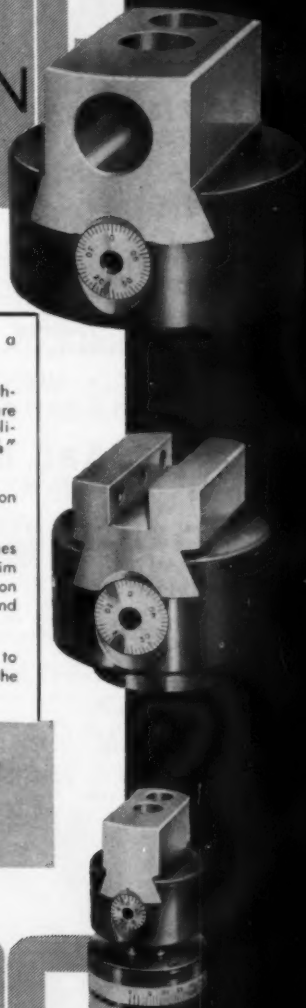
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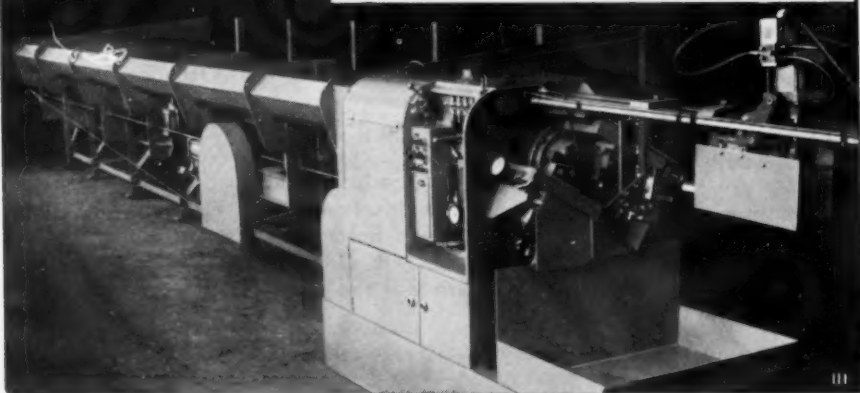
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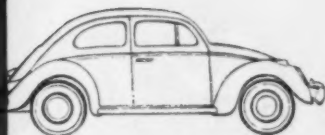
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# VOLKSWAGENWERK REVISITED

The bombed-out plant that the British Occupation Forces turned back to the Germans as "non-competitive" after World War II was producing 1,500 Volkswagens daily by the time BLUE BOOK's Bill Schleicher visited Wolfsburg in 1956. Today, five years later, production has more than doubled, through an unbeatable triumvirate of efficiency, modern facilities, and old-fashioned hard work. Here is a summary of Schleicher's conversation with Otto Hoehne, VW's production director, during a return visit this year.



**B  
B**

## An Interview with VW's Otto Hoehne

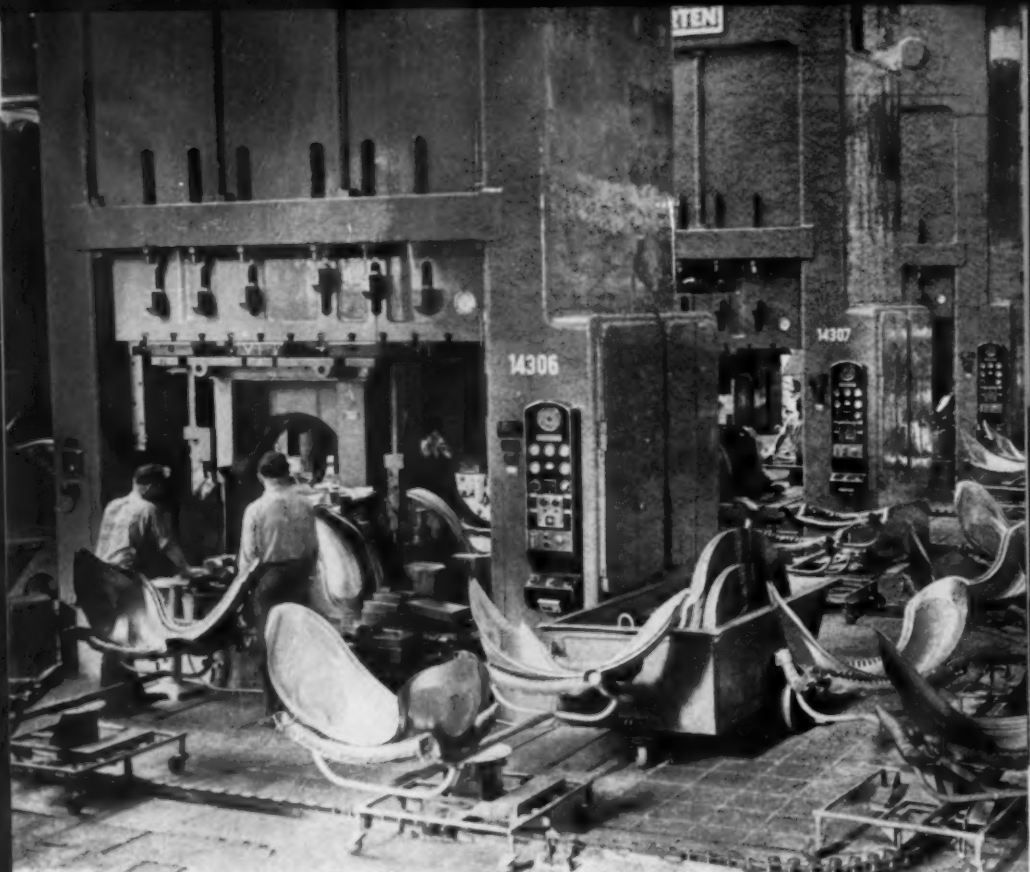


*Q. In 1956 when I visited here, Dr. Nordhoff told me you were producing 1,500 cars a day. At the present you are producing 3,400 passenger cars per day. What made this growth possible?*

*A. No one thing can be singled out, except possibly our basic philosophy which is to build a quality motor car of economical performance at a reasonable price.*

*Q. Henry Ford's original idea.*

*A. Exactly. Ford launched the automotive industry on this premise. We've never strayed from it. In addition, several other factors contributed to our present standing. Reasonable price is contingent on economical manufacturing and high-volume sales, and we have worked hard on both. We must not overlook the dedication of our workers and everyone else con-*



#### **VOLKSWAGENWERK REVISITED** continued

nected with VW over the years. As you know, there was nothing here after the war except rubble and a few shanties.

**Q. Did the government help after the war?**

**A.** We received no help from any government or from the Marshall Plan. The Federal Republic of Germany did not advance money or give any tax concessions to the young

company. Hard work, long hours, the necessity to survive, and the firm belief that the car on the drawing board would sell in the world market kept us going.

**Q. You said that reasonable price was contingent on economical manufacturing.**

**A.** Yes. We have no model changes. We spend our engineering time refining and perfecting the automobile. We



Many changes have taken place at VW since our first visit there in 1956. Automation has made tremendous strides.

The engine is now produced in Hannover. In 1956, it was still in Wolfsburg, which today is devoted to body production and assembly. The trucks are also made in Hannover.

At both Wolfsburg and Hannover, individual machine operations have given way to mechanization and in-line production. The process is tighter. Waste motion and old tools have been eliminated, and there is now a quiet, steady movement which never falters for a second.

As in 1956, we are still amazed at the lack of paperwork and, above all, the small size of the indirect labor force. Workers appear more prosperous; there is an air of determination, but not frenzy. They unquestionably work as hard now as in 1956, but new machines have greatly increased output.

do not have yearly bugs to iron out, nor do we start each year with a set of self-imposed problems. This permits us to concentrate on efficiency and to refine our tolerances to reach higher goals of quality. In addition, as we increase efficiency we can reduce the cost of the automobile.

**Q. How close are some of your tolerances?**

A. Balancing the crankshaft is to 1 gram; some of our parts range from

plus or minus .005 mm, and many of our surface finishes are to .001 mm.

**Q. To return to the subject of model changes: This is one of the outstanding features of the Volkswagen.**

A. So far we have been able to sell an automobile without changing the model each year. We feel if we build a quality automobile at low cost and low upkeep, people will buy it. As for the production aspect of this mat-

ter, let me say that we have concentrated on streamlining the efficiency of the plant. Our model is never frozen. We have no model year and do not operate between fixed periods of design and methods changes. With us, changes and improvements are continuous. We use our energies to effect improvements, not change; each day we concentrate on how we can build the car a little better, how we can streamline the operation a little more. You can't do this if you change models each year; furthermore, we've built the same car for so many years, most of the bugs have been ironed out.

**Q. Isn't much of the success of the VW due to the quality built into the car?**

A. Unquestionably! There is one inspector for every seven production workers. But most important, quality control is a management function; that is to say, the quality control manager is a part of management, with the same stature as the managers of production, engineering, and sales.

**Q. His is a distinct department?**

A. Yes, in most other plants, the quality control manager reports to production or manufacturing, coming thereby under the control of some other department. At VW no department has any jurisdiction over his affairs. His job is to make certain that each car which leaves Wolfsburg is in A-1 shape.

**Q. This must obviously give him con-**

**trol over every phase of reliability.**

A. Our quality control department sends technical men to steel mills, to rubber and glass manufacturers, and to other important suppliers to check all material destined for VW use. This saves both us and the suppliers a lot of grief and money, and prevents any slowdown of production due to delivery of inferior material which must be returned. When the raw material, such as sheet steel is received, we know it's right; there's no faltering or stumbling over testing and inspecting before it's put on the machine.

Inspection is performed by the quality control boys after every operation. This eliminates the accumulation of errors which are sometimes discovered only after additional expensive operations are performed. We don't look on quality control merely to see that the operation was performed according to print. To us, quality control guarantees that errors do not creep into any operation.

**Q. Almost like a good preventive maintenance program.**

A. Exactly, we don't want to pick out good from bad pieces at the end of the production process. By then the damage has been done. Let's make sure that bad pieces are not carried through the production cycle.

**Q. Based on this concept, quality control is a cost reduction program as well.**

A. Material is very expensive in West Germany. It's costly to waste it.



There is one inspector for every seven production workers at VW. This inspector is gaging critical crankshaft bearing diameters.

**Q. What is your labor situation, or is this a ticklish question?**

A. Not at all. Without the willingness of all our employees to work hard, VW would not have progressed. I cannot stress too highly the devoted attitude of our employees. They take pride in their work, their company, and their product.

Our biggest problem, as you know, is housing. There are not enough living quarters in Wolfsburg to accommodate the workers we need; consequently, we've had to move many of our facilities to other cities. The engine plant has been moved to Han-

nover, where we also build the trucks.

**Q. This makes it mandatory for you to increase efficiency so that less manpower is required to perform the job.**

A. Exactly. We must get manhours down. In the last three years we've reduced our manhours to produce a given amount by 50%. When we moved the engine plant and installed new equipment, we reduced our man-hours by 28%.

**Q. With no layoffs?**

A. With no layoffs. We simply absorb

## Statistics on VW

Employment at Wolfsburg is 37,000; at Hannover, 18,000; at Braunschweig, 4,000; at Kassel 6,500.

Factory expansion will represent a half billion dollar investment by the end of 1961.

Present daily production is 3,400 passenger cars and 600 trucks and station wagons. A fleet of 1,000 vehicles is needed for internal transportation.

Continuous-flow conveyor line totals 68 miles in Wolfsburg.

There are 21.9 miles of road at the Wolfsburg plant.

There are 31.2 miles of railway on the factory grounds, with twenty five tracks side by side at one point. In 1960, twelve diesel locomotives hauled about 75,000 freight trains of 60,000 double-decked cars loaded with VWs.

VW is the world's largest consumer of magnesium—144,000 tons.

Factory power is provided at Wolfsburg by eleven big turbines generating 165,000 kw from 300,000 tons of coal annually.

In August, 1955, ten years after the war, the millionth VW rolled off the assembly lines. In 1961, Volkswagen—world's fourth largest automaker—will produce 1,000,000 vehicles.

In 1961, Volkswagen was converted from government trusteeship to a public corporation. Stock ownership was restricted to investors in lower income brackets, with preference to VW workers.

Wolfsburg, which barely existed before World War II, grew from 18,000 hut dwellers in 1948 to over 60,000 citizens of a sparkling new town in 1960. Most of its people are young.

The factory sponsors free training programs for apprentices, foremen, and middle-management groups.

Junior executives with some experience and responsibility are sent to foreign countries and subsidiaries, for two years of on-the-job-training. Others are sent to foreign universities. Classes in foreign languages are held at the factory during the evening. In addition, scholarships are given to outstanding apprentices so they may go to engineering colleges.

## VOLKSWAGENWERK REVISITED continued

the workers and build more automobiles, and even then it's hard to get the backlog whittled down. The savings we pick up are used to improve the car, build it better, hold the price line, and deliver more benefits to the workers and to the city of Wolfsburg.

*Q. This must mean close cooperation*

*with labor. . . .*

*A. We've had the backing of labor.*

*Q. With benefits accruing to labor.*

*A. Our workers know that increased efficiency means better wages, more benefits . . .*

*Q. . . . and steady employment.*

**A.** The history of VW shows increased efficiency, increased sales, increased wages, and more job security. After all, what does good management and efficiency mean in the last analysis? Isn't it all for the benefit of the workers, the public, the consumer? The higher the efficiency, the lower the cost of the product, the more sales, the higher the employment. This is elementary.

**Q. What of the union?**

**A.** Approximately 40% of our employees belong to unions.

**Q. Union membership is not compulsory for VW workers?**

**A.** Under German law, all workers are free to join or not to join unions.

**Q. How does the union operate at VW?**

**A.** The employees, union and non-union alike, elect a twenty-three man workers council. German law provides that five members of the council be elected to serve on the company's board of directors. They participate in all directors meetings, with equal voting rights.

**Q. How are grievances handled?**

**A.** We have very few which ever come to the attention of management. They are usually solved by the workers themselves.

**Q. Everyone seems to be kept very busy in the plant.**

**A.** That is one of the reasons for VW's success. The company's labor policy and our country's social legislation give our employees real interest in their jobs.

**Q. There is then no running battle between union and management?**

**A.** VW and West Germany, like all industrial countries of the free world, must succeed in maintaining high employment, must export competitively must have economic growth. To achieve this, unions, workers, and management of all industries must

Famous names of American-made machine tools and equipment are frequently seen along VW's modern production lines in Wolfsburg.





# **VOLKSWAGENWERK REVISITED** continued

work together. Any other course is not in the best interests of the free world.

**Q.** You mentioned the installation of new equipment. How do you handle the problem of displaced workers?

**A.** Usually they are absorbed in the plant in an equal capacity. We need workers. We don't want to lose them. We simply want workers to produce more goods with better equipment.

**Q.** There is a nice point of distinction here. Many companies want to increase production with less workers so that the cost of manufacturing is reduced. This causes a problem . . .

**A.** . . . and also gets us into the realm

of philosophy on production, prices, sales, labor, and what have you. I want to return to the subject of the so-called displaced worker. Here at VW we have eight classes of employment. Each has its wage scale. Additional study and training on the part of a worker enables him to step into the next higher class if he qualifies. This means more money, more prestige, and shows growth. Let us assume that a worker in Class 5 is suddenly displaced by a machine. He is placed in another job in the same class. If no opening at the immediate moment exists, he is placed in the next lower class which has an opening. He performs the, let's say, Class 4 job, but is paid at the Class 5 rate for a period of three months. If, at the end of the



three month period no opening is found again at Class 5, he is retained at the Class 4 level.

*Q. How does the union feel about this?*

A. The unions and management work closely together on these matters.

*Q. The worker is free to leave if he chooses?*

A. He is free to leave. However, this sounds arbitrary and this is really not the case. Very few workers ever leave. A spot in their class is usually found. Often a worker will be ready to step into the next higher class. However, with our growth and expansion there are always more jobs than workers,

so the problem really does not exist except on paper.

*Q. Approximately how much do you spend on expansion and new equipment each year?*

A. We spend approximately 200 to 250 million Deutsche marks per year, which is between 50 and 62.5 million dollars.

*Q. Some of this is spent on American machine tools, isn't it?*

A. Yes, we have many U.S. machine tools. At one time, your production machines were the only ones available; today, some German-built machines are just as good. However, we still prefer certain American nameplates. We will always buy certain U.S. products, because to export our automobiles we must also import from you.

*Q. Isn't there a policy of some kind at VW covering this?*

A. We call it the Policy of Fair Exchange. Currently, we buy \$700,000 worth of steel and magnesium per month in America; more than half of all presses in the body plant are of American make, each costing about \$435,000. In the last three years VW has bought over \$50,000,000 worth of machines from America.

*Q. Do you have a machine tool replacement program?*

A. Not as such. Whenever we think a new machine will do a better job and lower our cost, we buy it, using a 13-month payoff period. Our aim is continuing efficiency with modern tools.

• • •





## 16-Ton Measuring Jumbo

# And Now, 5-Axis Tape-Controlled Inspection!

■ A 16-ton system that is commanded by a roll of punched tape and can complete in two hours almost 1000 precise measurements of a critical component such as a missile nose cone is the latest development of the Sheffield Corp., Dayton, Ohio. It would require about a month, company engineers say, to make the same measurements by any other means. The jumbo-size gage is so sensitive it can automatically detect a change in size as small as .000010".

Operating automatically from instructions coded on a tape, the system measures and records internal and external dimensions, wall thickness, and other geometrical conditions and relationships of objects of symmetry, such as cones, tubes, and hemispheres.

In addition to verifying the accuracy of parts of known dimensions, the

machine also can be used to determine and print out the dimensions of a part of unknown size which is within the range of the gage.

The system includes a one-piece gage base with moveable vertical and horizontal slides, a rotary table, a Bendix numerical-control unit, and a console containing the gaging and amplifying circuit, visual readout meters and automatic print-out system. The rotary table, mounted on the horizontal slide, carries the work-piece holding device. The two vertical slides carry the inner and outer gaging styli. Work up to 20" high by 20" in diameter can be inspected. Minimum inside radius of work is 2".

To eliminate heat generating sources from the gaging operation, the hydraulic power supply for the servo positioning control, electric panel, and



Sheffield's new universal 5-axis tape-controlled measuring machine weighs 16-tons. It can record up to 100,000 readings in an inch, detecting changes in size as small as .000010".

refrigeration unit are located outside of the environmentally controlled room in which the machine operates.

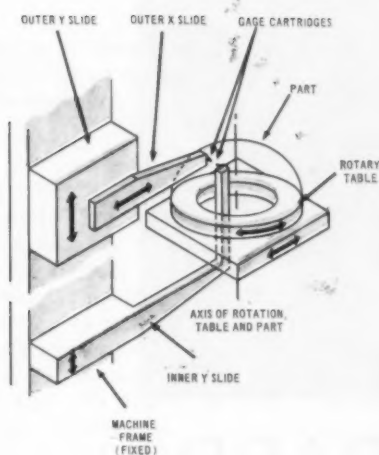
It will measure any point or angle within the 20" gaging range to an accuracy of .0001". Over a range of 20" the machine has a repeatability closer than  $\pm .000005$ ". Wall thickness is measured to .000050", and is the result of the machine automatically computing the algebraic difference between opposed gage points on internal and external surfaces of the work. All slides operate within .000015" of true position, despite the huge size of the gage and the heavy weight of the slides and table. No gaging machine of this size and for this purpose has ever before been produced that will measure to such an amazingly high degree of accuracy, Sheffield claims.

### Operation

The part to be gaged is mounted on

the rotary table with its longitudinal axes vertical and coincident with the axes of table rotation. Two slide-mounted rotating ball Electrojet gage cartridges are the sensing elements. They connect to Sheffield Accutron electronic amplifiers. One cartridge contacts the inner surface of the part and the other the outer surface.

The part's nominal dimensions, encoded in serial form on punched tape, are used as command signals for positioning the workpiece slide and the vertical slides carrying the Electrojet cartridges. With the Electrojets positioned for a given horizontal plane, the part is rotated about its vertical axis, either in controlled steps or continuously. Deviations from the nominal dimensions are printed out in tabular form as well as visually indicated for various points on the plane. The number of planes as well as the number of points of inspection depend upon the part specifications.



Visual reading of dimensional values is shown on a three-meter Accutron amplifier. One meter indicates the inner stylus, the second, the outer stylus, and the third meter shows wall thickness.

### The Positioning System

The numerical control unit translates the coded positional data on the tape into electrical command signals to actuate the machine's servo drives and to monitor its responses to the commands.

Each of the two vertical slides as well as the horizontal slide is independently controlled for precise positioning. Two servo systems are used on each slide: A power servo system moves the slides by means of hydraulic rams. An instrument servo system, which is independent of the power servos, detects the position of the slide

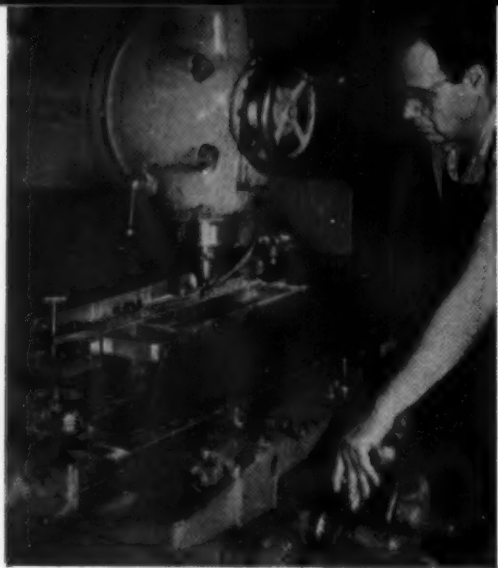
and generates the signals necessary to control slide motion or to lock the slide in position.

Three modes of gaging are provided: numerical-control scan gaging, numerical-control increment gaging, and operator-control gaging.

**Numerical-control scan gaging**—As the part is rotated slowly under numerical control, any dimensional deviation exceeding preset limits causes the rotation to stop, and position and excessive deviation are printed out. The table then rotates a preset amount, and if deviation is still excessive, stops, and position and deviation are again printed out. This sequence provides automatic point-by-point inspection and recording on a plane. This continues until the gage indicates the deviation is within the allowable limits, at which point scanning resumes. Such action thus provides scanning within set limits and automatic point-by-point inspection and recording of excessive deviation.

**Numerical-control increment gaging**—Here, the rotary table, under tape control, advances a preset amount, stops, and deviation and position are printed out. Deviations within preset limits are printed in black while those outside the limits are in red.

**Operator-control gaging**—Under this mode of gaging, the operator can set up all of the conditions manually that would be normally included in tape command. In addition, operator-control gaging prevents a part of unknown dimensions to be explored and slide positions printed out. The information obtained in this manner then becomes the manuscript tape for reproducing the part. • • •



# STANDARD TIME DATA

... for "guess-less"  
estimating.



## Part 2 - Milling Machines

By **E. A. Cyrol**

E. A. Cyrol & Company  
Management Consultants

■ In last month's article, it was pointed out that only 25 to 30% of the man-hours in machine shop areas are presently based on standard time data; that the rest of industry continues to use the old-fashioned rate setting methods typified by its interest in, "How many pieces do we get an hour?" We now know from experience that a plant that is not using properly engineered work standards has labor costs that are at least 25%—and may be as high as 100%—too high!

Milling operations have been chosen for the second in this series of articles on establishing standard time data because the versatility of the milling machine often involves short production runs with frequent setups, cutter changes, trips to the tool crib, and material handling problems. The whole milling operation is especially vulnerable to the inefficient use of time.

Before management tries to improve the productivity of machining operations within its plant, standard time data should be established for the machine tools and methods presently being used so that comparisons can be made to new cost reducing proposals.

The purpose of this series of articles is to show you how to develop usable work standards for your operations. The time values shown with the element descriptions and on the work sheets are from a number of shops

doing different types of work. These time values should not be used to establish work standards for your plant; the values are included in the article only as examples of other firms' experiences.

### How to setup standard time data

There are five steps in establishing standard time data. These steps, which were explained in detail in last month's article, are as follows:

- 1. Time study the operation** with several operators over several days. Record all the work elements carefully, noting especially the end points. Time each element in the smallest time increment possible.
- 2. Post the time study data** to comparison for analysis. In this form, work elements that are constant and those that are variable can be quickly spotted.
- 3. Analyze the data** to determine constant and variable elements. Chart the variables. At this point, look for possible methods improvements and incorporate them in the standard work cycle.
- 4. Perform a check study** to determine the validity of values found in step three. This will also establish time values for the new elements resulting from methods changes.
- 5. Write up the standard data** in permanent form, including detailed ele-

ment descriptions, tables of time values, etc. Prepare standard data worksheets to facilitate the determination of total time of an operation.

**The greater the detail, the better**

It is very important that a detailed description of elements be recorded so that the end points, or watch reading points, for each element will be clearly understood by any time study operator. Time studies that are not taken according to a very clearly defined elemental breakdown pattern are useless for standard data because like

elements cannot be compared to like elements. A carefully written description is also necessary to insure that any future changes in method will be properly reflected in the standards and standard data.

**Element description**

The elements listed below cover in detail the work done by the operator to perform each element. The values shown represent the amount of time allowed for an average operator working at normal pace to execute the element properly.

- 
1. Pick up piece from pan to fixture **.0195 Min.**  
This element includes the time to pick up a piece from a pan or open container at the machine and carry to within 1" of fixture. Allow only when part cannot be picked up during machine time.
  2. Pick up part from table to fixture **.0180 Min.**  
This element includes the time to pick up a part from the machine table and carry to within 1" of jig or fixture.
  3. Place piece in open jig or fixture **.0180 Min.**  
This element includes the time to place the piece in an open jig or fixture. The element starts at the time the operator guides the piece into the fixture and ends when he releases it.
  4. Place piece in open jig or fixture and positive locate **.0338 Min.**  
This element includes the time to place a piece in an open jig or fixture and locate the piece one way or press it down to a positive location or stop.
  5. Place piece in confined jig or fixture **.0422 Min.**  
This element includes the time to place the piece into a confined jig or fixture which has a restricted location or does not allow free movement of the hands in or out of the locating area.
  6. Lock jig or fixture (Air pedal) **.0108 Min.**  
This element includes the time to step on a foot pedal which actuates an air valve that locks a jig, fixture or chuck.
  7. Lock jig or fixture (Air-hand valve) **.0088 Min.**  
This element includes the time to turn on or press a valve that locks a jig, fixture or chuck, by hand.
  8. Lock jig or fixture (cam actuated) **.0192 Min.**  
This element includes the time to actuate a cam lever to close the collet on a chuck.

9. Lock vise ( $\frac{1}{2}$  turn) **.0289 Min.**

This element includes the time to reach for a vise handle and turn it a half turn to secure a part in a vise.

10. Lock screw-type collet closer **.0926 Min.**

This element includes the time to turn the handwheel on the dividing head to lock a part in the collet.

11. Engage feed (button or lever) **.0105 Min.**

This element includes the time to reach for and push the start button or engage the feed lever to start the table into rapid traverse toward the cutter.

12. Advance & return table Machine A Hand Feed **.0385 Min.**

Machine A Auto. Feed **.0257 Min.**

Machine B Auto. Feed **.0333 Min.**

Machine C Auto. Feed **.0710 Min.**

This element includes the time to reach for the handle, advance the table to the cutter and return the table to an unloading position, after completing the cut, and release the handle on the hand miller.

On the power feed machine, the time includes the rapid traverse to the cutter and rapid return to the unloading position.

13. Index chuck **.0115 Min.**

This element includes the time to reach for the chuck handle, and index the chuck  $90^\circ$  or  $180^\circ$ . This element is necessary when milling a hex or a square on a part.

14. Index dividing head **.0310 Min.**

This element includes the time to turn the "Lock" lever, index the dividing head, and secure the lock lever.

15. Unlock jig or fixture (Air pedal) **.0088 Min.**

This element includes the time to depress a foot pedal which actuates air valve that opens a jig-fixture or chuck.

16. Unlock jig or fixture (Air-hand valve) **.0115 Min.**

This element includes the time to turn off a lever or press an air valve to open a jig, fixture, or chuck.

17. Unlock jig or fixture (cam actuated) **.0147 Min.**

This element includes the time to release the cam lever on the chuck to open the collet.

18. Unlock vise ( $\frac{1}{2}$  turn) **.0167 Min.**

This element includes the time to reach for the vise handle and to turn it a half-turn to loosen the part in the vise.

19. Unlock screw-type collet closer **.0532 Min.**

This element includes the time to turn the handwheel on the dividing head to loosen the part in the collet.

20. Remove piece from open fixture **.0132 Min.**

This element includes the time to reach for and remove the part from the fixture. This element ends when part leaves the fixture.

21. Remove part from confined fixture **.0400 Min.**

This element includes the time to reach for and remove a piece from

## STANDARD TIME DATA

a fixture, when there is a restriction of the operators hands in getting at the part.

22. Part aside (Drop) **.0074 Min.**

This element includes the time to transport and release the part to drop in a pan or container. This element begins after the part leaves the fixture and ends when part leaves the hand.

23. Part aside to table **.0130 Min.**

This element includes the time to transport the part and lay it on the machine table for subsequent burring or stacking in pan on machine time.

24. Blow off fixture or chuck **.0510 Min.**

This element includes the time to pick up the air hose, blow off a chuck or fixture, and replace the hose.

25. Wipe off fixture or chuck **.0222 Min.**

This element includes the time to wipe or brush chips, by hand, from the nesting area of a fixture.

26. Flush fixture with oil **.0233 Min.**

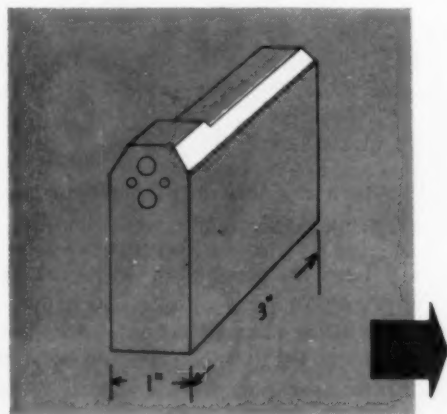
This element includes the time to advance the table by hand, let the flow of oil flush the fixture and return the table.

### Using the data

A worksheet is actually a check sheet and should be used as such. Thus, it is possible to select the best combination—from a methods point of view—of elements for the operation to be performed. For instance, on a production milling operation, should one or two fixtures be used? Standard data will tell you; with standard data available for reference, it is possible for the process and methods engineer to make a comparison of operating time and cost to decide which is most economical—to grind, mill, broach, shape, plane, or perhaps some other process—before the job is tooled up.

On the following two pages are shown one firm's standards for setting up milling machines and following these pages is an example of the same firm's standard data sheet for milling machines. We regret that space does

not permit publishing additional data sheets to illustrate how other firms have laid out their worksheets. The layout of the worksheet is not important; but, it should be conducive to rapid calculation of a production standard. . . .



The example worked out on this and the following page indicates those elements that are necessary to setup a horizontal milling machine to mill the beveled edges on the part shown on the opposite page.

## STANDARD TIME DATA continued

		SUB TOTAL	39 20
28. Sizing Continued			
MULTIPLE CUTTERS			
(1) Scale Dimension	3.20		
(1) Micr. Dimension	5.70		
(2) Scale Dimensions	5.80		
(2) Micr. Dimensions	9.50		
COMBINATION CUT (1) Scale & (1) Micr.	7.40		
(3) Scale Dimensions	8.50		
(3) Micr. Dimensions	13.50		
COMBINATIONS OF (3) -- Scale & Micr. Dim.	10.00		
1st Keyway	6.90		
Each Added Keyway in line with 1st Keyway	4.30		
" " " not " " " " "	5.10		
WOODRUFF KEYS			
1st Keyway	10.00		
Each Added Keyway in line with 1st Keyway	6.20		
" " " not " " " " "	7.40		
29. INSPECTION			
SINGLE CUTTER & (1) Dimension on MULTIPLE CUTTERS			
(1) 1st Scale Dimension locating from rough casting	3.00		
(2) " " " " " previously milled surface.	2.60		
(3) 1st Micr. " " " " "	3.50		
(4) Each added scale dimension	1.30		
(5) " " " Micr. dimension	4.20		
MULTIPLE CUTTERS			
TWO DIMENSIONS--Scale	4.00	4 00	
Combination Scale & Micr.	5.00		
Micr.	6.00		
THREE DIMENSIONS--Scale	6.00		
Combination Scale & Micr. Dim.	5.00		
Micr.	10.00		
FOUR DIMENSIONS--Scale	9.00		
Combination Scale & Micr. Dim.	12.00		
Micr.	15.00		
BORING--1st Hole Micr. or Scale Dim.			
Each added Hole	3.00		
Two Holes in Line for Plug Check	2.00		
WOODRUFF KEY--	3.00		
Any Job Requiring the Use of V-Blocks or an Angle Plate & Indicator	4.00		
	9.00		
TOTAL ACTUAL TIME		43 20	
PLUS 20 MINUTES PERSONAL 15 MINUTES NORMAL DELAY ALLOW. 7.9%		3 40	
TOTAL PRODUCTION TIME		46 60	
PLUS 20% INCENTIVE ADJUSTMENT		9 32	
TOTAL INCENTIVE SET-UP STANDARD		55 92	
DATE COMPUTED	1-20-61	USE	56 0
COMPUTED BY	WKC		

# MILLING MACHINE STANDARD DATA SHEET

PART NAME

OPERATION

MACHINE NAME

Part No. \_\_\_\_\_  
Oper. No. \_\_\_\_\_  
Dept. No. \_\_\_\_\_  
E. M. O. \_\_\_\_\_  
Mach. No.'s \_\_\_\_\_

Table No. I

LOAD AND UNLOAD

Wt.	Avg. Sng	Wt.	Avg. Sng
1	.14	.28	.52
2	.15	.27	.53
3	.16	.27	.53
4	.16	.28	.54
5	.17	.29	.55
6	.17	.29	.55
7	.18	.30	.56
8	.18	.30	.56
9	.19	.31	.57
10	.19	.32	.58
11	.20	.33	.59
12	.20	.33	.59
13	.21	.34	.60
14	.21	.34	.60
15	.22	.35	.61

Table No. II

CLAMPING

NOTE	NOTE	NOTE
LOOSEN NUT	28 7" C. CLAMP OFF & ON	.31
NUT OFF COMPLETE	JACK SCREW SET & OFF	.31
LOOSEN NUT & U-CL. OFF & ON	VISE TAL	.30
TIE BOLT & U-CL. OFF & ON	CHUCK TAL	.38
SET SCREW T & L	CHUCK INDEX 180°	.10
QUICK CLAMP T & L	DIV. HEAD INDEX 10°	.50
WING NUT OR KNUBBLED SCREW	STAMP PIECE	.12

Table No. IV

GAUGING

MICR. O.D.	.28
MICR. I.D.	.27
MICR. DEPTH	.40
SCALE CHECK	.31
WOODRUFF	.30
V-GRINDER	.64
PLUG	.28
FEELER	.30
PROTRACTOR & SCRIBE	.30
TOTAL GAUGING	
GAUGING PER PCE.	

Table No. III

MISCELLANEOUS ELEMENTS

LENGTH OF PIECE	10"	20"	30"	40"	50"
LEVEL-ALIGN-SHIM	.30	.50	.80	1.25	2.00
RIGHT LINE UP	.10	.25	.40	.80	.78
LOCATING SURFACE AREA					
BRUSH CHIPS (Double if Brag Lead)					
FILE LOCATING SURFACE	.12	.24	.36	.48	.60

## CALCULATION OF RATE

Total Actual Time Per Piece	
Plus % Allowance	
Total Production Time	
Plus 8% Inactive Adj.	
STANDARD MINUTES PER PIECE	
SET-UP STANDARD	

## DOWN TIME ALLOWANCE

TYPE OF DELAY	Time	Per Cent
Personal		
Normal Delay		
Tool Care		

## PREVIOUS RATE

REMARKS	PREVIOUS SET UP

## TOTALS

Computed By

Date of Study

Tool Equip Record By

Date Posted

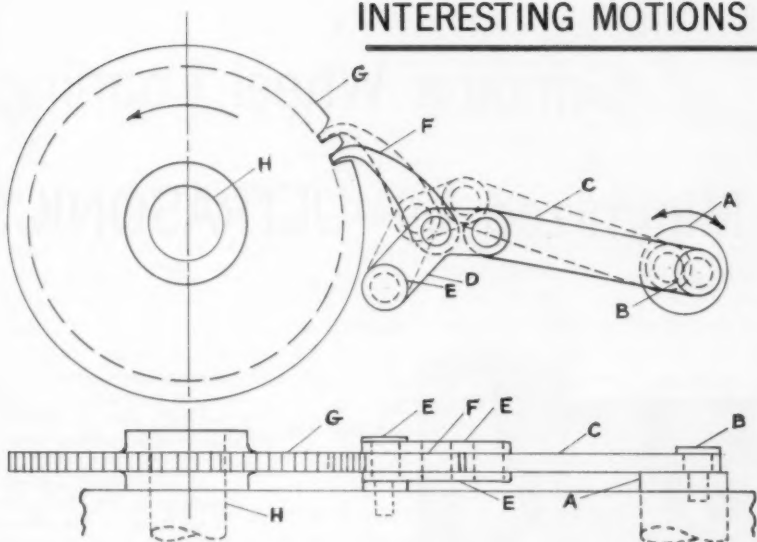
Form No. 8-3541

The front side of a standard data sheet for milling machines. On this side, the part and operation should be described, manual elements listed, allowance figures shown, and the standard data calculated.

## STANDARD TIME DATA continued

[illegible]

The back side should show the setup, the cutting elements listed and detailed, machine times calculated, machine manipulating times listed, and cutting and machine times summarized. The tool card for the operator duplicates the left-half of this side of the standard data sheet.



## Reversing Rotation Operates Ratchet in One Direction

■ The ratchet mechanism illustrated here transmits, by means of a rotating shaft, intermittent rotation to a gear—one tooth for each rotation of the drive shaft and in the same direction regardless of the direction of rotation of the drive shaft.

This mechanism was designed for use on a machine that fabricates ornamental wire screening which is fed through the machine at a uniform intermittent rate. The shaft that operates the mechanism reverses direction as required by the screen's pattern.

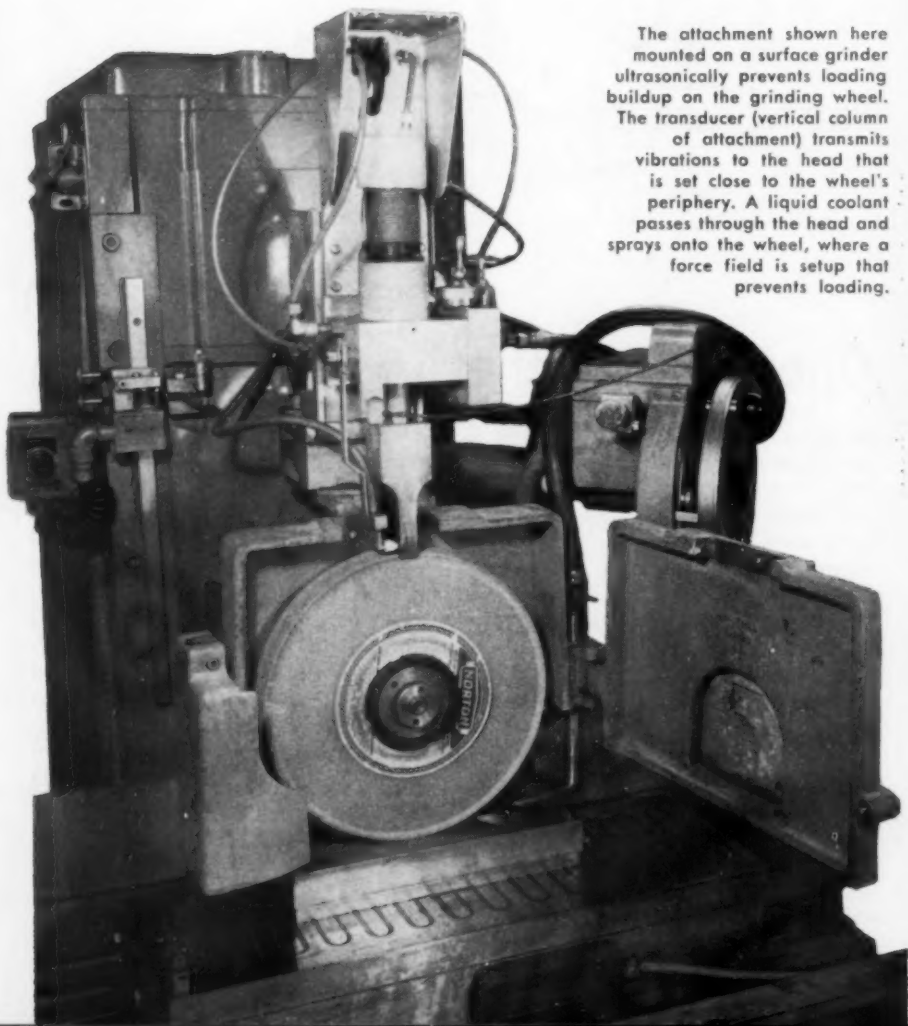
The shaft A, which rotates in either direction, carries the stud B, which forms a connection with one end of

link C, the opposite end of which is connected to two links D which swivel on stud E located on a stationary part of the machine. Pawl F is carried on a pin through the two links D, and engages the teeth of gear G mounted on shaft H.

In the drawing, the solid outlines indicate the positions of the parts when the stud B is to the right of the center of shaft A. When shaft A has made a half-revolution, in either direction, the positions of the parts are shown by broken lines. The links D and pawl F form a toggle linkage which causes gear G to be moved one tooth with each actuation. • • •

# Grinding Wheel Loading Minimized by ULTRASONICS

The attachment shown here mounted on a surface grinder ultrasonically prevents loading buildup on the grinding wheel. The transducer (vertical column of attachment) transmits vibrations to the head that is set close to the wheel's periphery. A liquid coolant passes through the head and sprays onto the wheel, where a force field is setup that prevents loading.



■ Grinding wheel loading can be minimized by an attachment recently announced by the Cavitron Corp., Long Island City, N.Y. The unit is called "Ever-Grind." It increases productivity of cylindrical and surface grinding machines by preventing the usual buildup of metallic debris between the abrasive particles on the wheel. It does this by the use of ultrasonic energy in the range of 20,000 cps.

Source of the intense ultrasonic vibrations is a magnetostrictive transducer mounted on the wheel guard of the machine. An aluminum tool-head the size of a cigarette package is attached to the end of the transducer and positioned a few thousandths of an inch above the grinding wheel. The tool-head delivers the ultrasonic energy through a coolant interposed between the vibrator and the wheel.

What happens then can best be described as the bursting of thousands of bubbles per second within the agitated coolant. According to Arthur Kuris, president of Cavitron, a complex set of physical conditions is established that produces a very effective force field at the wheel surface—enough to inhibit wheel loading.

#### **Field trials show promise**

Several companies cooperated with Cavitron in testing the ultrasonic attachment. In one operation at Lycoming Div., Avco Corp. the attachment

was used on a rotary surface grinder to grind a flanged surface on a nitrided steel forging. Floor-to-floor time for rough grinding was reduced from 30 to 17 minutes per part. Without Ever-Grind, the wheel had to be dressed every three parts; with the unit, dressing was not required for a run of eleven parts.

In the finish grinding operation on the same part, wheel dressing, which was normally required after every part, was not necessary for the entire run of twenty parts.

At Remington Rand Corp.'s Electric Shaver Div. it was found that, in plunge grinding shaver heads, twenty-five trays containing sixty heads each could be ground before redressing the wheel. Previous experience was ten trays before stopping to dress the wheel.

In Cavitron's laboratory a number of tests were conducted which opened up the possibilities of this development. In one test, .0475" of brass was removed by an A-320-J8-V wheel without loading or wheel wear. The finish obtained was 2 to 4 micro inch.

In another test on 303 stainless, using an A-60-K8-V wheel, .337" was removed with the unit operating. No loading resulted or dressing was required. At this point the edges had just started to break down. Without the unit the wheel became loaded after removing .127" and edges were rounded. Finish with the unit was 35 micro inch and 60 without. • • •



# How to Fasten Carbide to Steel

## Part 2: Mechanical Attachment

By **Grant A. Morrison**  
Manager, Application Engineering  
Metallurgical Products Dept.  
General Electric Co., Detroit

■ Carbide and steel components can be rigidly assembled by mechanical attachment, using bolts, screws, or one of several clamping arrangements. Mechanical mounting overcomes some of the limitations of brazing and cementing carbides. A mechanically attached assembly is stronger than an adhesive bond and is not limited to a narrow operating temperature range. Since a high bonding temperature is not required for mechanical assembly, as it is in brazing, thermal strains are confined to the temperature range in which the assembly operates.

Mechanical attachment may be used to advantage in applications where the

carbide is under a heavy operating load. A cost saving can be effected when designing the carbide part by reducing the size of the working, expendable piece of carbide and by seating it on a carbide block of sufficient mass to provide rigid support.

Assemblies designed for mechanical attachment should take advantage of cemented carbide's high compressive strength wherever possible. Since carbide is notch sensitive to a greater degree than most materials, notches must be avoided on highly stressed parts.

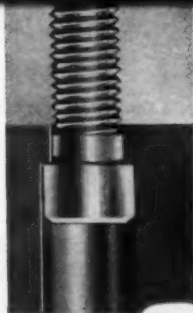
Carbide has a low coefficient of friction against steel, therefore clamped assemblies will require higher contact pressures between the surfaces than would be necessary between two steel surfaces, if movement is not prevented by positive stops and shoulders.

For maximum support and rigidity, a mechanically held piece should be fitted into a pocket or recess. The operational forces against the carbide seat it in the recess, the clamping mechanism only holds the carbide in place.

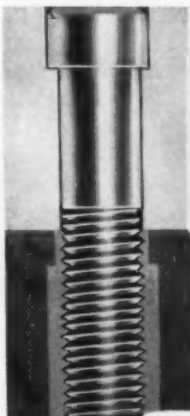
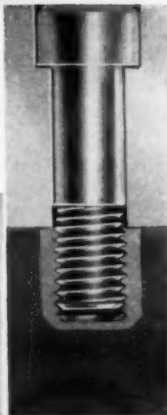
#### Methods of mechanical attachment

There are several methods of mechanically attaching carbide sections. Which method you use will depend upon the type of application and the size and shape of the insert, as well as upon other design considerations. The basic criteria are cost, simplicity of design, and ability to withstand work loads.

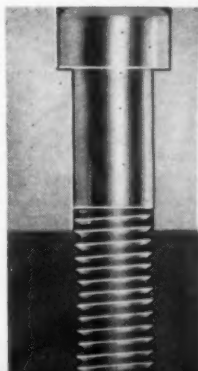
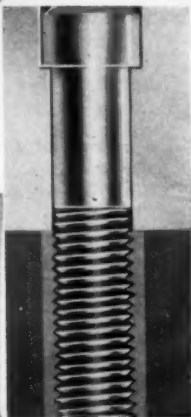
Five distinct methods utilizing threaded bolt designs are shown in Figs. 1-5. Fig. 1 shows a counterbored and drilled hole, preformed in a carbide nib. This hole is machined

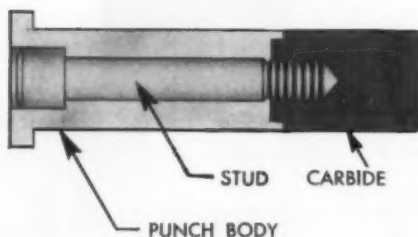


1. Preformed counterbored and drilled hole.
2. Brazed plug—straight.
3. Brazed plug with shoulder

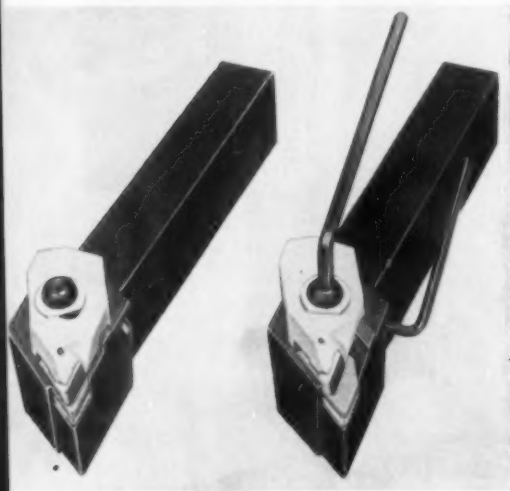


4. Blind plug.
5. Hole tapped in hard carbide.

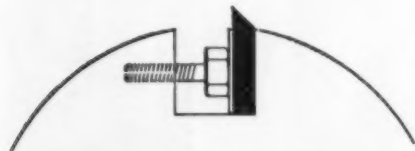




6. Carbide held in position with a cap screw. The hole is tapped-in-the-solid.



7. An example of direct clamping. The clamp holds the carbide tip in this Adjust-O-Breaker toolholder.



8. Woodworking knife held in clamps.

in the insert while the carbide is still in the soft state. The holes are preformed slightly oversize to accommodate a cap screw without further machining. The counterbore can be made as deep as necessary to provide for regrinds. When height limitations are a factor, a countersunk design can be used.

Fig. 2 shows a straight brazed plug. Here, a soft steel plug is brazed into a preformed hole. For maximum braze strength, leave a clearance of .007" to .011" on the diameter between the hole and plug. A low-expansion, high-nickel alloy steel (Invar) is recommended for the brazed plug. Cold-rolled steel plugs may be used for small diameters. The plug is drilled and tapped after finishing the carbide.

Fig. 3 is a brazed plug with shoulder, or it could have a tapered section, for maximum regrind life.

Fig. 4 illustrates the use of a blind plug. This type of plug is used when a continuous carbide surface is required. Though the blind plug and brazed plug with shoulder are generally installed by the carbide manufacturer and tapped by the user, the complete process can be done by the user.

Fig. 5 shows the threads tapped directly in hard carbide. Solid carbide may be tapped in the hard state by electro-arc machining. The advantage of this technique is that holes may be held to close center-to-center tolerances. The hole may be tapped

through as shown in Fig. 5 or it may be blind. The usual practice is to electro-arc after the carbide segment is finished or semi-finished to insure squareness with the work piece.

Most firms go to a job shop that has electro-arc equipment for tapping carbide in the solid. In general, the cost of electro-arc is greater than installing brazed plugs, which can be used as an alternative to this design. In some cases, however, the additional cost of tapping-in-the-solid may be offset by the advantages gained. Fig. 6 illustrates an example in which a tapped hole is used for attaching carbide to steel.

### Design of brazed inserts

Table I shows the dimensional limits recommended for brazed and tapped plugs. The same insert diameter and minimum carbide wall specifications apply to through-type plugs as well as blind plugs.

### Direct clamping

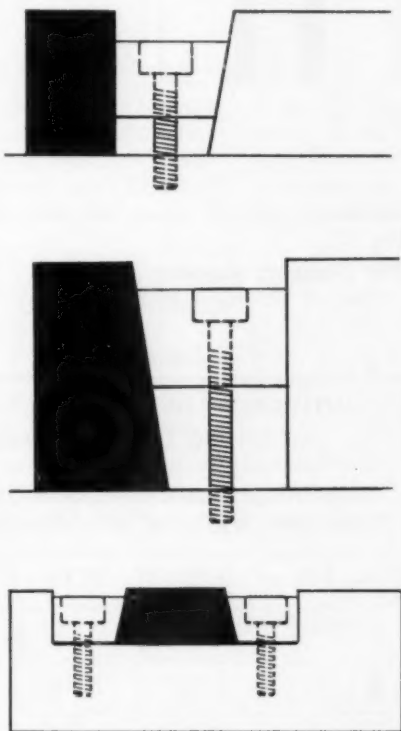
The toolholder shown in Fig. 7 is a good example of a functional method of mechanical attachment by direct clamping. The tip is held in place by a clamp which performs a dual function—it prevents movement of the tip and serves as a chip breaker. The tip is pocketed in a recess and cannot move when under load. The seat supports the insert and provides a rigid, tough surface for the insert. There are a number of variations of this clamping method.

Long woodworking knives provide an example of a simple, positive clamping method used in a rotating workhead. The knives are seated in a

pocket and are held in position by bolts exerting pressure against the carbide through a steel strip that serves to distribute the load, Fig. 8.

### Indirect clamping

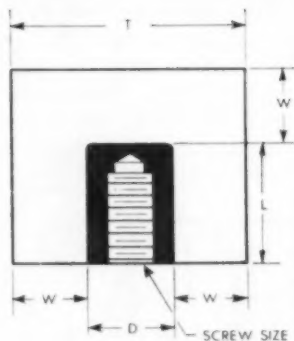
Wedging is a practical method of holding carbide securely in a slot or recess. The high pressures developed by a wedge are useful where movement of the carbide must be prevented by friction alone. Several design variations are used; the more



9. Wedges. The high pressures developed by a wedge are useful where movement of the carbide must be prevented by friction alone.

TABLE I

Minimum Width of Carbide $T = (D + 2W)$	Minimum Insert Diameter D	Screw Size	Minimum Depth of Insert L	Minimum Wall W
.312	.187	5	$\frac{3}{16}$	$\frac{1}{16}$
.350	.225	8	$\frac{1}{4}$	$\frac{1}{16}$
.375	.250	10	$\frac{3}{16}$	$\frac{1}{16}$
.406	.281	12	$\frac{3}{8}$	$\frac{1}{16}$
.500	.375	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{16}$
.625	.437	$\frac{3}{16}$	$\frac{3}{8}$	$\frac{3}{32}$
.687	.500	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{32}$
.750	.562	$\frac{7}{16}$	$\frac{3}{8}$	$\frac{3}{32}$
.875	.625	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{8}$
.937	.687	$\frac{9}{16}$	$\frac{1}{2}$	$\frac{1}{8}$
1.000	.750	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{8}$
1.500	1.000	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{4}$



common methods being shown in Fig. 9.

#### The clamping shoulder

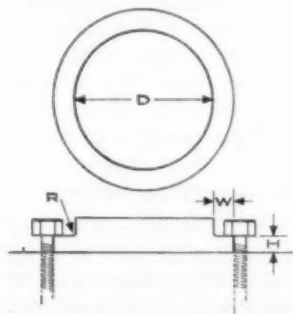
One of the most popular methods

of retaining carbide tools and dies is by the use of a clamping shoulder. A small shoulder on the carbide element serves as a positive method of holding

Table II

DIMENSIONAL LIMITS FOR MECHANICAL ATTACHING OF CARBIDE NIBS			
DIAMETER OF PART-D	SHOULDER WIDTH-W	SHOULDER HEIGHT-H	CORNER RADIUS-R
—1/2	3/32	3/16	1/32
1/2—1	1/8	1/4	3/64
1—2	5/32	5/16	1/16
2—3	5/32	3/8	5/64
3—4	3/16	1/2	5/64

D—Insert Diameter  
W—Wall Thickness  
T—Width of Cemented Carbide Section  
 $= D + 2W$   
L—Minimum Depth of Insert



it in position. The rules of design are simple:

1. Make the shoulder as narrow as possible consistent with the requirements of the application. Large shoulders increase carbide cost and detract from the strength of the assembly.
2. Provide for a radius on the corner of the carbide section to reduce stress concentration. Table II is a reference guide to carbide shoulder design.

### Mounting rings on steel arbors

Some applications require mounting a carbide ring on a steel shaft or arbor. On these applications, the carbide ring must be fitted so that both lateral movement and rotation on the shaft are prevented. When a carbide ring is mounted on a steel shaft, the stress at the ID of the ring is tensile rather than compressive. This hoop tension must be at a minimum to avoid carbide failure.

### Arbor-mounted rings

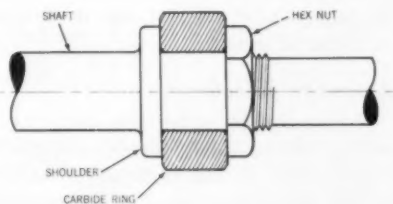
Lateral movement of a carbide ring on a shaft is prevented by clamping it against a shoulder with a threaded nut, Fig. 10. A tongue or bevel design may also be used. A keyway in the design, as in slitters, prevents rotation of the ring on the shaft and provides a positive drive. Standard keyway designs, however, are not recommended for use on applications involving hoop tension because of the notch effect caused by the keyway, Fig. 11.

In some applications, it will be necessary to mount the carbide ring with an interference fit. This type of mounting performs two functions: It helps prevent rotation of the carbide

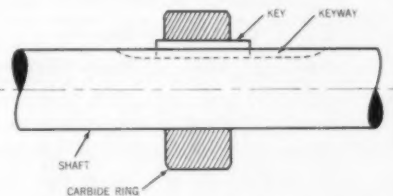
and it distributes the workload uniformly through full and continuous bearing contact. The design approach for shrinking carbide on steel shafts is to provide an interference fit sufficient to prevent carbide rotation while avoiding excessive hoop tension. The suggested amount of interference for work rolls is .00015" to .0002" per inch of diameter. On harder, more brittle grades of carbide, a reduced interference is advisable. The carbide wall thickness also influences the selection of a shrink fit. Table III gives the specifications for some typical roll assemblies.

### Watch operating temperatures

Where temperature of the roll is increased substantially during operation, take into consideration the different coefficients of expansion of carbide and steel. A cooling device

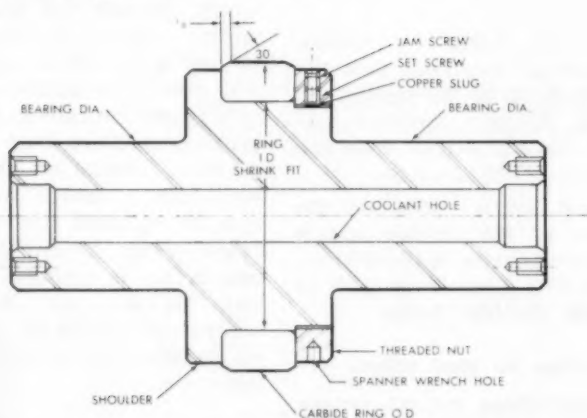


10. Threaded nut prevents lateral movement and resists rotation of the carbide.



11. Keyway prevents carbide rotation relative to arbor.

# FASTENING CARBIDE TO STEEL continued



12. Wire flattening roll using nut and shoulder design. A shrink fit is used to assure concentricity. In this application, a steel hardness of 41-45 Rc is recommended; when sleeve type bearings are used, a hardness of 60 Rc is required on the bearing surfaces.

may have to be incorporated in the design. High-nickel, low-expansion alloys can be used in some applications; however, limited hardenability as well as higher cost restrict the usefulness of these alloys.

## Assembly procedures

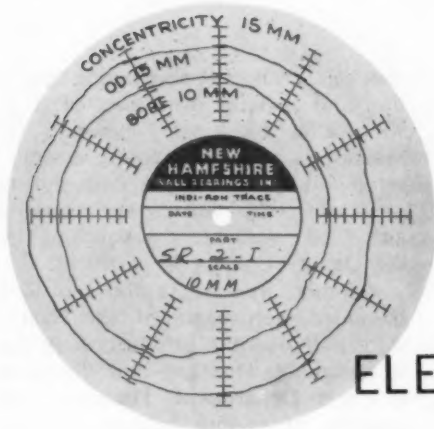
To assemble a carbide ring on a steel shaft, heat the carbide to approximately 600°F and position it on the shaft. The operation must be per-

formed quickly to avoid seizure before the ring is seated. If the design of the shaft is such that its mass is relatively small, provision should be made to draw away the heat immediately after assembly. Otherwise, transmitted heat may cause excessive shaft expansion and breakage of the carbide. This hazard can be reduced by deep freezing the shaft prior to assembly, thereby allowing a reduction in the shrink temperature of the ring. • • •

TABLE III

AMOUNT OF INTERFERENCE FOR MOUNTING CARBIDE RING ON A SHAFT				
CARBIDE DIMENSIONS			AMOUNT OF INTERFERENCE*	
O.D.	I.D.	WALL THICKNESS	GRADE 55A	GRADE 833
3	2	1/2	.0004 to .0006	.0002 to .0004
4-1/2	3-3/8	9/16	.0006 to .0008	.0003 to .0005
6	4-3/4	5/8	.0008 to .0012	.0006 to .0008
8	6-1/2	3/4	.0010 to .0015	.0008 to .0010
10	8	1	.0012 to .0017	.0010 to .0012

\*Amount of interference is equal to the difference between the O.D. of the Arbor and the I.D. of the carbide nib.



**B  
B**

## ELECTRONIC GAGING + POLAR TRACING

### Control Bearing Race Production

By **Charles Hoyt, Gage Engineer**  
New Hampshire Ball Bearings, Inc.  
Peterborough, New Hampshire

■ Present day applications of instrument ball bearings require increasingly better running qualities. Such running qualities cannot be obtained without controlling roundness of component rings because roundness is related to control of radial play and lower starting and running torque. Surfaces such as ring raceway and inner ring bore and raceway are ground by referencing from a ground diameter using either a roll or shoe type locating arrangement, thereby transferring any out-of-roundness present in the diameter to the operation being performed.

The two- and three-point indicator type roundness gage is no longer adequate to measure this characteristic in high precision instrument ball bearings. However, electronic gaging is well suited to the industry's need for accurate measurement of extremely small values. New Hampshire Ball Bearings, Inc. uses the Indi-Ron, manu-

## ELECTRONIC GAGING continued

factured by Cleveland Instrument Co., which provides measurement magnification to 10,000X. A centering adjustment locates the axis of the work on the axis of the turntable spindle, which runs out less than three millionths of one inch (.000003"). In use, the spindle rotates slowly while an electronic gage head translates radial surface variations on a polar chart trace. Comparing the chart trace with a master having concentric circles of known radii, deviations of .000005" from a true circle can be measured with confidence.

At our plant, there are seven Indi-Rons in use for process control. This permits us to have one instrument for

checking each critical grinding operation and also for inspection of raceways after finishing. Roundness inspection is performed during machine setup and on a frequency basis during operation. Chart traces are recorded and filed, available for checking by the Quality Control Department.

Another area where the Indi-Ron has aided improvement of New Hampshire Ball Bearings' products is in the Rotassembly Division and Special Bearings Department. Housings and bearings of various internal and external configuration are inspected for roundness, concentricity and other characteristics indicative of the instrument's gaging versatility • • •

Gaging the OD of an outer instrument bearing ring for roundness. As the spindle rotates, variations from roundness are recorded on polar chart traces.

Without disturbing the setup, the gaging head is moved over to gage the ID. When the same chart is used for both ID and OD traces, a profile of ID/OD concentricity is provided.



**BB**

## CHIPLESS MACHINING

By **Charles H. Wick**, Vice-President  
Dudgeon, Taylor & Bruske, Inc.  
Detroit, Michigan

# High-Energy-Spark Forming

■ In addition to the pneumatic-mechanical method and the explosive forming methods described in the last two columns of this series, there is a third high-energy rate process—spark forming. Although it is the newest of the three, it has already been tagged with an imposing list of descriptive names: electrohydraulic, hydroelectric, hydrospace, electro-spark, direct static conversion, packaged lightning, and spark bomb forming.

High-energy-spark forming consists essentially of the sudden discharge of a high-voltage electric spark across a gap under water or other suitable liquid medium. This produces a single pressure pulse, or shock wave, that spreads rapidly and has sufficient energy to form metal parts.

Equipment required is composed basically of a high-voltage power supply source, such as a rectifier; a charging resistor; a bank of capacitors, connected in parallel, for storing the charge; suitable switching circuits; and coaxial electrodes. Discharge can be initiated by physically reducing the length of the air gap, by removing an insulator



1. Examples of high-energy-spark forming. The amount of energy used can be precisely controlled; the results are consistent. Also, successive applications of pressure can be made to the same part without changing the setup.

#### CHIPLESS MACHINING continued

from between the switching electrodes, or by ionizing air in the gap by means of a discharge in an auxiliary gap. Sometimes, an initiating wire is attached between the electrodes, the wire being transformed upon discharge into metallic vapor which expands against the water.

Considerable development work is being done with high-energy-spark forming at Republic Aviation Corp., Convair Division of General Dynamics Corp., Chrysler Corp.'s Missile Division, and the General Electric Co. Some authorities claim it is the most promising of all high-energy-rate forming methods. All agree that it provides a convenient, economical, and powerful method of converting electrical to mechanical energy.

One of the major advantages of the process is that it is safer than explosive forming, and permits in-plant operations. The amount of energy used can be precisely controlled, and the results obtained are consistently repeatable. Another advantage is that successive applications of pressure can be made to the same part, when required, without changing the setup.

Principal applications of high-energy-spark forming thus far have been beading, bulging, expanding, and sizing hollow shapes; punching and piercing; and forming cup shapes, channels, and panels. It is particularly suited to hard-to-form metals, and shapes difficult to produce by conventional methods. For very large parts, however, explosive forming is

more economical, because of the high cost of the sizable power supply and storage units that would be required for high-energy-spark forming. Samples of parts produced under a development program at G.E.'s General Engineering Laboratory in Schenectady, N.Y., are shown in Fig. 1.

The geyser of water produced by an electrically-induced underwater explosion at that laboratory appears in Fig. 2. With high-energy-spark forming, completely closed dies can be used to take full advantage of the pressure wave, since the volume of gas generated is relatively insignificant. However, water must be removed from between the metal to be formed and the die, and this space must be vented or evacuated of air.

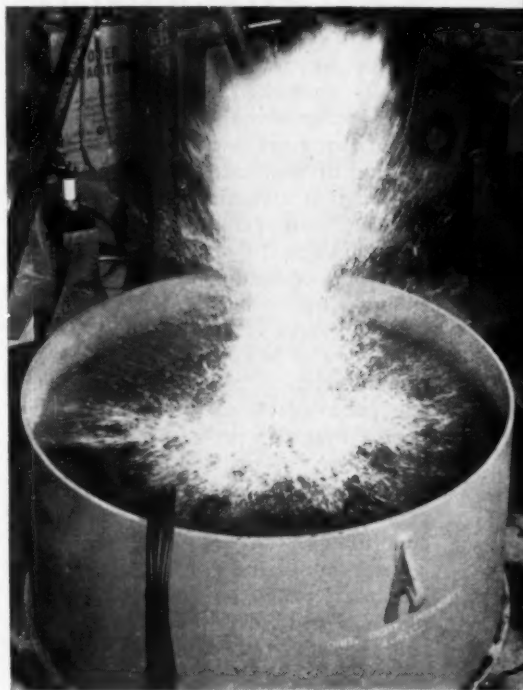
Good results have been obtained with mild steel, aluminum, or epoxy resin dies, with the electrodes extending through the split-die cover-plates. The distance of the spark from the work is a critical variable, since the pressure diminishes rapidly with increased distances. However, this distance must exceed the length of the spark gap to prevent short circuiting. The shape and position of the electrodes and/or initiating wires depend on the wave form desired for a particular job.

With other variables constant, the pressure available will depend on the voltage used and amount of energy stored in the capacitor bank, since the energy increases as the square of the voltage. While small parts have been formed with 4000 volts or less, power up to 50,000 volts has been used, and plans are to go to 100,000 volts or more.

G.E.'s laboratory has thus far successfully used the technique to form titanium, niobium, beryllium-copper, and the more difficult grades of stainless steel, and believes the process can be used in forming tungsten and molybdenum. Parts up to 10" in diameter by 3/32" thick have been formed, and it is planned to produce missile sections 10' or more in diameter and at least 1" thick.

Russian developments in high-energy-spark forming are said to be even further advanced than ours. One report has the process applied to a continuous strip mill. • • •

2. High-energy-spark forming provides convenience of operation; the explosion shown here was made in a laboratory.



**B  
B**



## English-like Language Directs Tape-Producing Computer

■ The preparation of tape for numerically controlled machine tools has been further simplified by IBM Corp. Recognizing the need for a simplified method of translating blueprint information into numerical form, the firm spent 25 man-years of joint work with United Aircraft Corp. in the development of a computer program. The resultant program is identified as "Autoprompt"—short for Automatic Programming of Machine Tools.

All numerical control programming systems available up to now have required that the programmer write a description of each individual tool path for a cutting shape. IBM's Autoprompt system eliminates this procedure, with an automatic tool-path generation feature in which the programmer writes out a few English-like statements defining an entire cutting region composed of one or more constituent surfaces. The computer

then automatically generates an efficient set of cutting paths for the entire region, maintaining the specified inside and outside tolerances without further burden on the programmer.

The language for Autoprompt contains words that describe shapes and surfaces, such as Cone, Cylinder, Hyperbolic paraboloid, Sphere, Taurus. In addition, the system also contains words that designate the relationships between surfaces: Angle, Axis point, Intersection of, Surface point, etc.

Designed for use where some of the most costly and most complex problems occur—the area of continuous path, three-dimensional milling—Autoprompt is an advanced technique of tape preparation claimed to bring the production potential and cost slashing advantages of numerical control to a broader segment of industry.

• • •



## THE PRACTICAL DIEMAKER

By **Paul Prikos**  
Prikos & Becker Tool Co.  
Skokie, Illinois

# KNOW YOUR COSTS!

■ It is surprising, but many die shops do not know the real cost of building and repairing dies! Even the captive die shops of large corporations that are models of financial efficiency sometimes think that they know their costs, but when a study is made, actual costs are something else again. The trouble usually lies in inadequate cost records and record keeping.

In our operations, which are fairly typical, we have found several different methods of keeping track of essential cost information, especially die repair costs and direct manufacturing costs. Captive die shops should also keep track of die work being done on the outside.

Figure 1 shows our chart for keeping track of die repair costs. This form not only records costs but also becomes a history of what operations were performed and in what time.

The tool cost sheet shown in Fig. 2 is used to keep track of direct manufacturing costs. It also becomes a record of the hours and material required, both estimated and actual. The hours are tabulated from the time cards of the diemaker, who punches in and out on each job.

*continued*

**Scheduling is also important to know**

No form is shown for our method of scheduling work-in-process because

we utilize a standard peg-board flow-chart. We list the hours on the board according to individual jobs. Daily or

DIE REPAIR CHART		
CUSTOMER _____		T _____
P.O. NO. _____		
TOOL OR PART NO. _____		
DATE RECEIVED _____		
DUE DATE _____		
NATURE OF REPAIR _____		
_____		
_____		
_____		
REPAIR ELEMENTS	HRS.	OUR COMMENTS
1. Sharpen Die	_____	_____
2. Replace Parts	_____	_____
3. Replace Sections	_____	_____
4. Timing	_____	_____
5. Replace Punches	_____	_____
6. Rework Dowel Holes	_____	_____
7. Replace Nests	_____	_____
8. Troubleshoot Die	_____	_____
9. Add New Station	_____	_____
10. Alter Form Blocks	_____	_____
11. Stripper Lineup	_____	_____
12. Piece Part Inspection	_____	_____
13. _____	_____	_____
14. _____	_____	_____
15. _____	_____	_____
TOTALS		_____
Labor Costs		_____
Mat. Costs		_____
Price		_____
Released by _____		
Date _____		
		Priks & Becker Tool Co. 8121 N. Lawndale Avenue Skokie, Ill. OR 5-3910
Shipment - Via _____		
CUSTOMER COMMENTS _____		
_____		

1. This form is used in our shop to record the costs incurred in repairing dies.

weekly movement of the pegs shows the progress of the work as it approaches its designated goal. The board also shows at a glance the shop load and serves as an aid in establishing delivery dates on new work.

The methods that I have mentioned here can control the die work in most shops and can reveal actual costs; they do not require much investment and do not require time-consuming paper work.

[illegible]

2. Direct manufacturing costs are recorded on this tool cost sheet. Hours are tabulated from time cards.

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LIFE THAN T-15.

WATERBURY--FACING STANDARD DIE BLOCK MATERIAL AT RC 35--REX 49  
LASTED LONGER THAN T-15 AND CAST COBALT ALLOY.

EAST HARTFORD--TURNING TITANIUM 6 ALUMINUM 4 ZIRCONIUM 2

CLEVELAND--CUT-OFF TOOL CUTTING  $\frac{3}{4}$ " SQ. T-431 STAINLESS--REX 49  
CUT 50-60 PIECES BEFORE RESHARPENING. T-4, T-5, T-8 AND T-15  
CUT 10-15 PIECES BEFORE RESHARPENING.

CHICAGO--REX 49 RUNNING 80 PER CENT LONGER BETWEEN SHARPENING  
FOR TURNING NICKEL SILVER ALLOY AND 50 PER CENT LONGER FOR  
TURNING MAGNETIC IRON THAN T-2.

NEW YORK--TURNING HIGH NICKEL ALLOY--REX 49 OUTPERFORMED T-15.

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Pittsburgh 30, Pennsylvania.*

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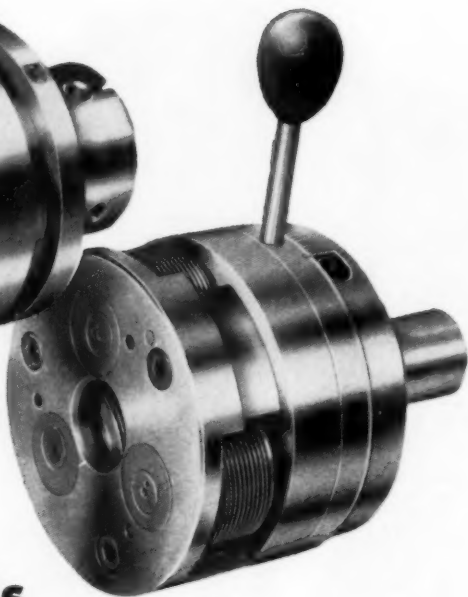
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## LANDIS thread rolling heads

LANDIS Research has developed the LANDIS Thread Rolling Head, featuring replaceable helix angle bushings—allowing rolling threads with exact helix angles without purchasing major head components. The same head may be used for producing both left- and right-hand threads through the use of right- or left-hand bushing sets.

The helix angle established for the standard bushing set is a "mean" angle suitable for rolling all diameters and pitches within the respective UNF and UNC ranges of the Heads. However, when the exact helix angle is required, the inexpensive helix angle bushings can be substituted for the standard bushings.



LANDIS Thread Rolling Heads will produce Class 4 threads of excellent finish at the high speeds used for carbide tooling without impairing roll life. These Heads can be operated indefinitely without adjustment as thread rolls never require regrinding. The rolls are designed in a manner which allows them to be reversed and both ends used. Self-opening Rotary and Stationary styles are now available in four models for use on a variety of machines. The range is  $\frac{1}{4}$ " —  $1\frac{1}{4}$ " UNF and UNC. For complete information request Bulletin F-99.

522-3

**LANDIS Machine COMPANY**

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**B  
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## NUMERICAL CONTROL FOR THE MACHINE SHOP

By James J. Childs

the controlling medium . . .

# PUNCHED TAPE

■ One of the principal values of numerical control lies in its ability to produce different types of work on general-purpose machine tools. The medium used to transfer the required numerical data to the machine thus assumes prime importance.

During the past ten years, various systems have been developed utilizing data mediums ranging from punched cards to punched tapes approximately 10" wide. The many tape configurations that were developing were of serious concern to both equipment builders and machine tool users since different tapes would require different preparation equipment and eliminate the possibility of interchanging tapes on different makes of machines. A variety of input media in a shop would also require that part programmers and data processing personnel be

trained in using many systems and numerical languages.

This evolving problem was recognized approximately five years ago, when the Electronics Industries Association, representing machine tool and systems builders, and the Aerospace Industries Association, comprised of numerical control users, engaged in the development of tape standards. It was realized by both groups that unless reasonable standardization was effected, the future of numerical control would be in serious jeopardy. There has been continuous liaison between the organizations, and compatible standards have been developed by both.

In October, 1959, the EIA issued Standard RS-227, which describes a 1" wide tape having a maximum of

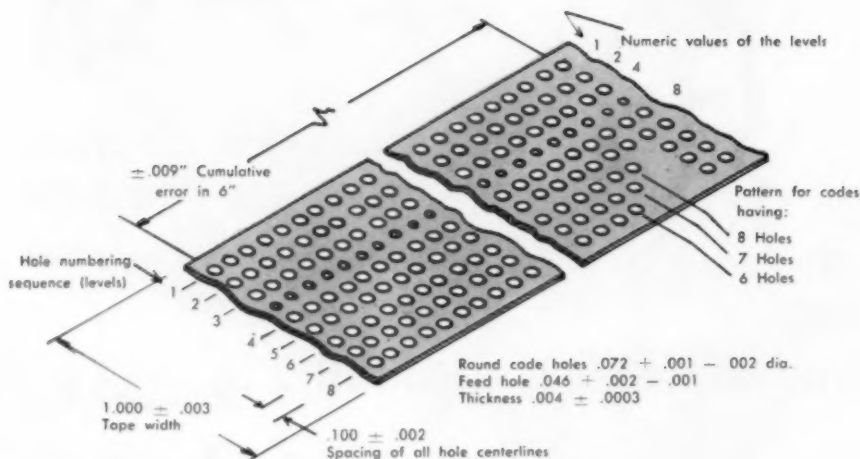


Fig. 1. EIA and AIA standard for numerical control punched tape. The tape must be manufactured to close tolerance in order to limit the variety of tape preparation and reading equipment.

eight rows, or levels, of holes running longitudinally. The diameter and spacing of the holes is also specified, thus limiting different styles of tape preparation equipment that might be required of a potential user.

In January, 1960, the AIA released NAS 943, which describes the hole patterns for numbers and letters in addition to the same tape dimensional specifications of the EIA standard. It is interesting to note that almost all numerical control systems builders have adopted the standard 1" punched tape. Buyers of numerical control machine tools should, therefore, be particularly concerned that equipment they are procuring adheres to the latest suggested standards and is capable of utilizing the recommended tape.

Fig. 1 describes the present EIA-AIA standard tape. Further EIA standards are in the proposal stage, while AIA has advanced code configurations for letters, numbers, and exclamation notations. See Fig. 2.

The coding described in Fig. 2 is contained in the AIA's NAS 943. The various hole patterns punched on the



Fig. 2. Code identification as described in the AIA's NAS 943. Numbers and letters are expressed by a configuration of punched holes running across the width of the tape. Since the total number of holes across the tape must be odd, an additional hole is punched in level 5 when the numeric code is even. This is called a parity check. Thus the number 3 is described by punching holes in Levels 1 and 2 and a hole in Level 5 must be punched to realize an odd number of holes across the tape.

Standard Level Numbers 8 7 6 5 4 • 3 2 1	Digit or Letter Codes	Standard Level Numbers 8 7 6 5 4 • 3 2 1	Digit or Letter Codes
6 •	0	7 5 • 3 2 1	p
• 1	1	7 5 4 •	q
• 2	2	7 4 • 1	r
5 • 2 1	3	6 5 • 2	s
• 3	4	6 • 2 1	t
5 • 3 1	5	6 5 • 3	u
5 • 3 2	6	6 • 3 1	v
• 3 2 1	7	6 • 3 2	w
4 •	8	6 5 • 3 2 1	x
5 4 • 1	9	6 5 4 •	y
7 6 • 1	a	6 4 • 1	z
7 6 • 2	b	7 6 4 • 2 1	. (period)
7 6 5 • 2 1	c	6 5 4 • 2 1	, (comma)
7 6 • 3	d	7 6 5 •	+ (plus)
7 6 5 • 3 1	e	7 •	- (minus)
7 6 5 • 3 2	f	6 5 • 1	√ (check)
7 6 • 3 2 1	g	7 6 5 4 • 3 2 1	Delete
7 6 4 •	h	8 •	End of Block
7 6 5 4 • 1	i	4 • 2 1	End of Record
7 5 • 1	j	5 •	Space
7 5 • 2	k	6 4 • 2	Back Space
7 • 2 1	l	6 5 4 • 3 2	Tab
7 5 • 3	m	7 6 5 4 • 3	Upper Case
7 • 3 1	n	7 6 5 4 • 2	Lower Case
7 • 3 2	o		

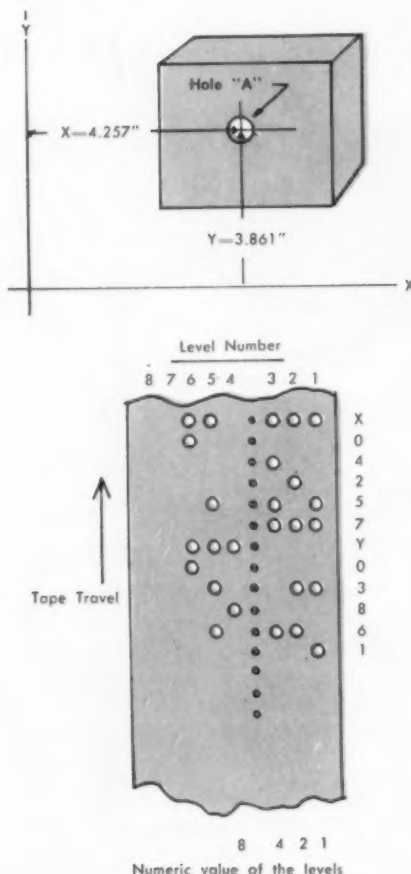


Fig. 3. The punched coded language shown on the tape would be required to drill the hole shown in the simple part directly above the tape. Additional information, such as codes for starting and stopping coolant and automatically turning the spindle on or off and the feed and speed rates can also be added to the tape. Distances from the X and Y axes are noted on the tape as y and x values. Normally, five numerals must be expressed and, therefore, a zero has been inserted before both four digit numbers. Decimal points can usually be omitted.

tape denote either numbers or letters which are used to describe the command positions and operations of machine tools. Since instructions are predominately numeric, the number codes are far more prevalent. Alphabetic notations are generally used to describe auxiliary functions, such as turning the coolant on or off, or starting and stopping the spindle.

NAS 943 also incorporates straight a binary code wherever the hole patterns are read along the length of the tape instead of across the tape. The code shown in Fig. 2 conforms to a "binary coded decimal" format and can be readily translated.

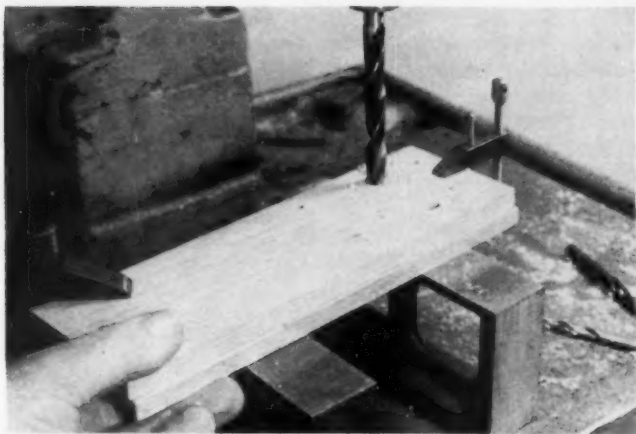
Level number 1 is equal to a numerical value of one. Level number 2 is equal to a numerical value of two. Level number 3 is equal to a numerical value of four, while Level number 4 is equal to a value of eight. The holes in these four levels (rows) can therefore be combined to express any number from 1 through 9.

If we wished to denote the number 1, we would punch a hole in Level 1. If the number 7 were required, holes would be punched in Levels 1, 2 and 3. Levels 5, 6, 7 and 8 are used to assist in describing alphabetic and related notations.

Fig. 3 describes a simple part requiring a hole to be drilled at point A. The X and Y coordinates (distances from Y and X axes) are described on the tape in the binary coded decimal language. This language contains the necessary instructions to move the machine in position to perform the drilling operation at point A. The tape format might appear as shown in the lower portion of Fig. 3.

• • •

## Shop Hints

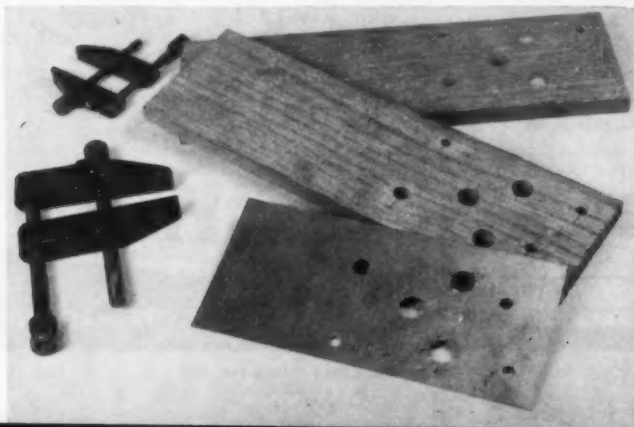


### DRILLING HOLES IN THIN SHEET METAL

By H. J. Gerber

■ Drilling neat and accurate holes in thin sheet metal, such as paper-thin brass shim stock, is very difficult unless special precautions are taken. When faced with a job of this kind, sandwich the thin metal between two pieces of hard wood.

This procedure is effective in preventing out-of-round holes, burrs, or holes with ragged edges. I have successfully produced near-perfect holes in sheet brass only one-thousandth thick. . . .



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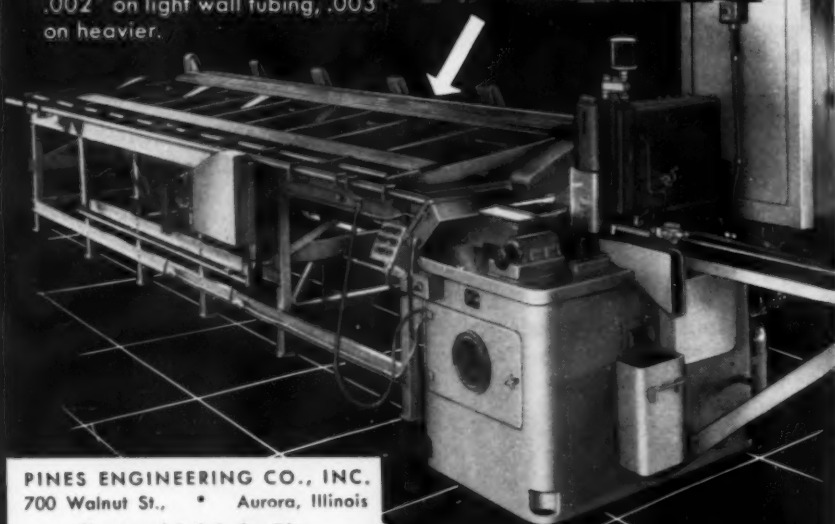
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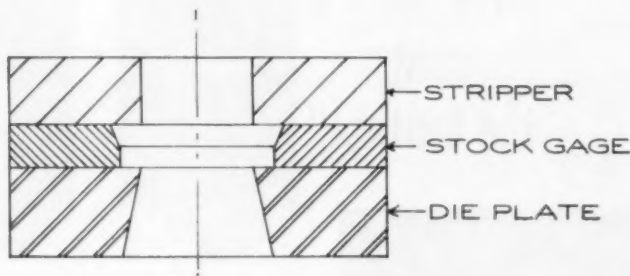
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### STRIP ALIGNMENT AND EXPANSION PROBLEMS OVERCOME BY TAPERED STOCK-GAGE

By Federico Strasser

■ When metal strips and coils are blanked they expand, and the heavier the gage the greater the expansion or spreading. In order to prevent the strip from sticking between the stock-gages, it is common practice to make the distance between them larger than the strip width. But, the accuracy of the product may be impaired, in the case of progressive dies, because excessive allowance does not always lay in the stampings in their correct location.

One solution to the problem of

strip alignment and expansion is to make the distance between the stock-gages equal to the strip width plus a small allowance, but to taper the top inner surfaces of the stock-gages with a rather large angle, as shown in the sketch. In operation, the strip firmly adheres to the punch and is carried upward after the blanking action. When the strip is stripped from the punch it is then in the upper, tapered zone of the canal, where it is free from hindrances and may be easily moved to the next blanking station.

• • •

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### BROACHING SQUARE HOLES WITHOUT USING A BROACH

By Robert Hill

■ I was recently confronted with the problem of making a square hole, but the usual tools needed to do the job were not available. I had high hopes that there should be an easier way to

make a square hole than by laborious filing. There was; here's how I solved the problem.

I selected a  $\frac{5}{8}$ " lathe tool bit (the size of the hole) and chamfered the end so it would have a good start when

continued

# "The No. 3's split the tenths!"

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"Our operators feel that these are the best machines they have ever worked on. They take care of the tenth-splitting tolerances required by industry today. Over the years we have enlarged our Moore Jig Boring and Jig Grinding Department to 15 machines." These are the words of Herbert Harig, President (left above), and Karl Harig, Chairman (at right), Harig Manufacturing Corporation, Chicago, Illinois.



Among the highly skilled toolroom operators in the Federal Products Corporation, Providence, Rhode Island, is this talented jig grinder operator, Mrs. Florence Smith. Mrs. Smith achieves ultra-precise results with the No. 3 Moore Jig Grinder.



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You will easily break the "tenth" barrier with this accurate machine. No gibs...no overhang...improved drive...speed range of 60 to 2250 RPM...11 x 24" table working surface. It bores, drills, reams and spots holes in dies, jigs and production parts with unequalled speed and accuracy.

All hardened, ground and lapped ways. Made and calibrated to the new international inch.

Write today for literature describing the many advantages of the No. 3 Moore Jig Borers and Jig Grinders.



With this new, larger No. 3 model, you can grind—with split-tenth accuracy—holes plus regular and irregular contours to size and location after hardening. Faster strokes are provided for chop-grinding...infinite spindle speeds, 40 to 250 RPM...larger table working surface, 11 x 24".

**MOORE SPECIAL TOOL COMPANY, INC.**

800 Union Avenue, Bridgeport 7, Conn.



"We have found that it costs real dollars and cents to operate without Moore equipment. This cost factor is just one of many reasons why we recently added the new Moore Model No. 3 Jig Grinder. This Machine, with its tenth-splitting accuracy, hardened ways and wider range, enables us to service more customers better." Statement by Val Koller, President, Koller Die & Tool Co., Milwaukee, Wisconsin.

pushed through a round hole made for it. A portion of the metal around the hole was heated to a light cherry-red, then the bit was quickly layed on top of vise jaws; the chamfered end of the tool bit was then driven into the hole. After the tool bit was knocked out, it left a square hole. The expansion of the metal when the tool bit

entered the hole was not enough to be noticed.

This method of making square holes could be used for a wide variety of sizes because standard tool bits cover a wide range. I was very much pleased with the results of this experiment. The hole was as good as, if not better than, a file could have done. • • •

### ONE METHOD OF MACHINING A ROUGH SURFACE

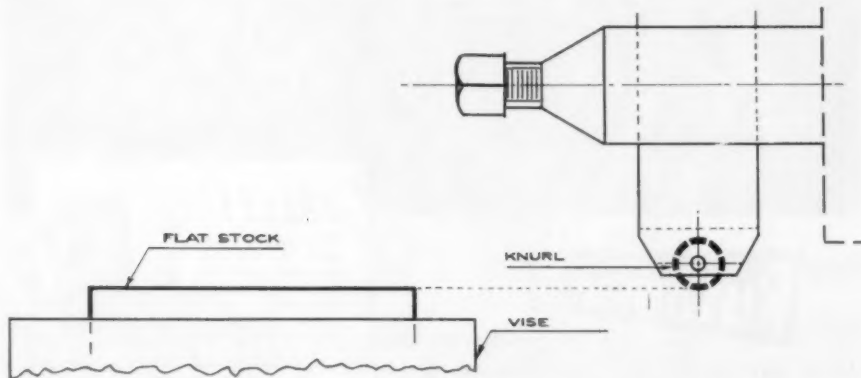
By Robert Hill

■ Recently confronted with a job that required machining a rough surface on several rectangularly-shaped c.r.s. blocks and not knowing of any set procedure to accomplish this, I tried using a knurling tool mounted in the tool post of a shaper. It worked very well.

Parallel blocks support the work in the shaper's vise, but use a level or dial indicator to check the parallelism of the work and the shaper's ram. After the work is mounted and prop-

erly aligned, the ram is moved out so that the tool post is over the work, thus assuring adequate clearance. The knurling tool is then firmly clamped in the tool post. Bring the work up, by means of the vertical feed screw, until it almost touches the knurl; set the stroke so that that the tool overrides at both ends of the stroke. Retract the ram and set the knurl for the desired depth of cut.

A slow speed is used, as is the general practice for knurling. For best results, use a cutting oil. • • •



# FOR AS LITTLE AS \$65 YOU CAN NOW HAVE THE CONVENIENCE OF A Gusher TANK UNIT

Yes, your Ruthman Gusher Tank unit is an efficient coolant system which will supply copious coolant flow for machines which are not equipped with coolant pumps or as auxiliary or fully portable systems.

- Precision Built
- Re-uses Coolant
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- Dynamically Balanced



T-4 Tank Unit—1/30 HP complete with nozzle hose, cord ... ready to go to work. Tank capacity 10 gals.

T-10, T-10A Tank Unit 1/10 to 1/4 HP Tank capacity 10 gals.

T-16, T-32, T-50—1/4 to 1/2 HP Tank capacity 16, 32 and 50 gals.

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Tank Selection Bulletin in 61A, including capacities, motor characteristics, etc.  
Write today or call  
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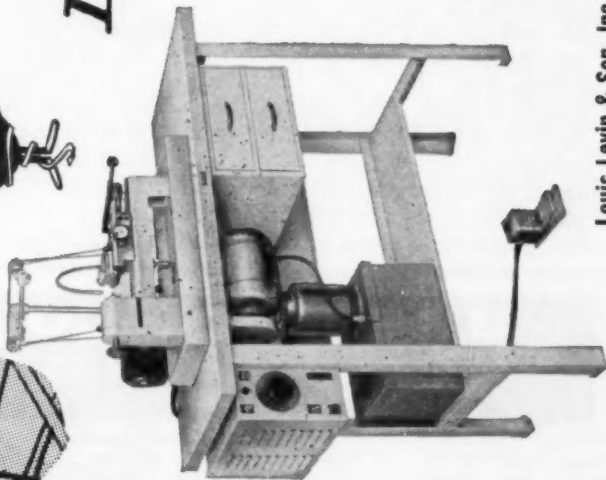
# ARE YOU PROPERLY GEARED FOR MINIATURIZATION?

## DRILL MICRO-HOLES

DOWN TO .0016" with SPEED & ACCURACY

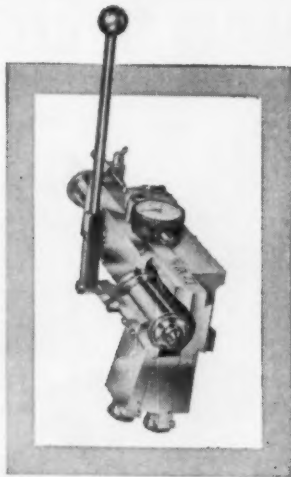
### **LEVIN<sup>®</sup>** MICRO-DRILLING MACHINE

Designed for the most precise drilling of small holes. The drilling spindle, as well as the head stock spindle, revolves and thus the maximum straightness and concentricity are assured. The feed is so arranged that it does not depend on the operator's sense of feel and the smallest drills may be safely used.

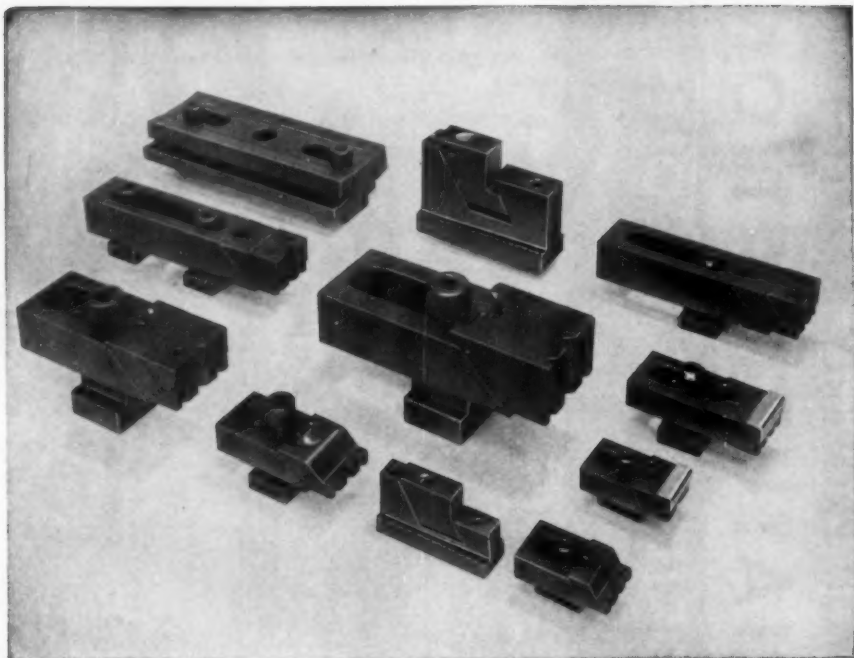


\* Smallest commercial drill available.

For full details of Drilling Machine and Instrument Lathes send for catalog T.



Louis Levin & Son, Inc., 3573 Hayden Ave., Culver City, Calif.



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J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.

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Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

Compact, efficient design of J & S Jaw Clamps eliminates the usual obstruction problems — no interference with measuring tool readings.

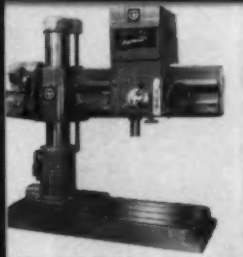
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## THIS ALL NEW BICKFORD 11" RADIAL...

### has the head that helps the operator

The new Bickford 11" Chipmaster has special design features to make the operator's job easier — and get more work done per day. Many of these features have never appeared before on any radial, regardless of size.

- 12 speeds, 9 power feeds — 50% more feeds than any other 11" radial. Tap leads available at no extra cost.
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- Magnetic drive clutch — electrically actuated — never needs adjustment.
- 14" of spindle travel — reduces machine manipulation during deep-hole drilling.
- Involute spline drives to spindle and all head gearing — positive drive eliminates all backlash for smoother operation and longer life.

Call your Giddings & Lewis distributor for complete details, or write.



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It shows you the production advantages, machine features, and lists complete specifications.

#### BICKFORD CHIPMASTER RADIAL DRILLING MACHINES



## GIDDINGS & LEWIS

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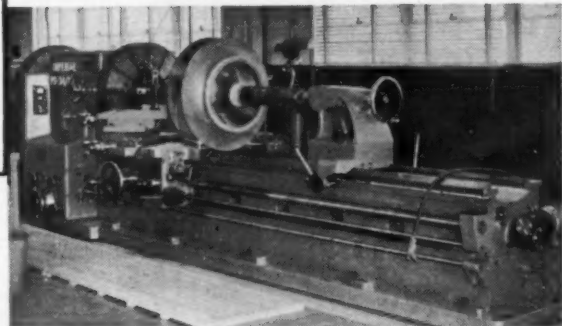
BICKFORD . . . world's most complete line of drilling machines . . . radials to 34" . . . uprights to 39" . . . ultra-precision Numeridrills . . . portables and universals . . . 3 to 50 hp. B-61-2



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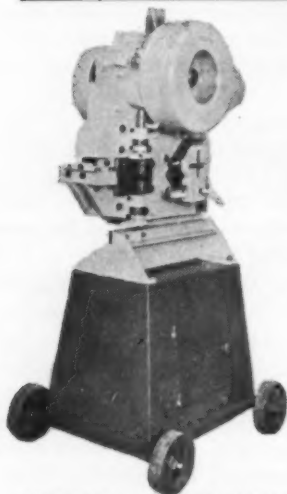
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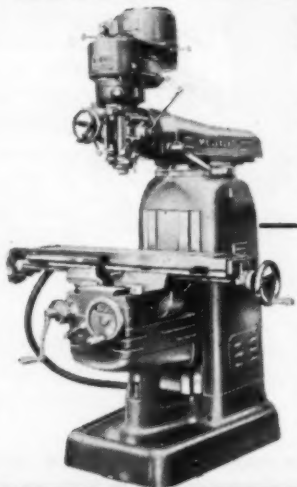
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Stationary and portable types  
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**\$2895.**



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Model IS TURRET MILL

Complete \$2034.50

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Compound "Knuckle Joint," 12"  
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table. Power feed to table measur-  
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cessories.

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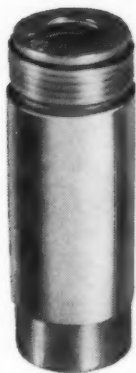
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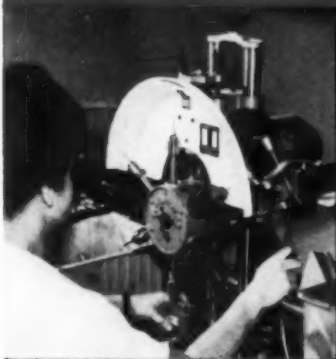
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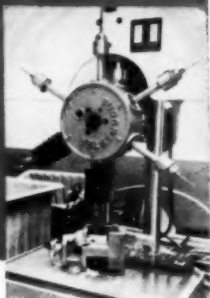
# Burgmaster BENCH MODEL

## TURRET DRILL



*"Saves 89%  
of Equipment Cost...  
Increases Production  
120% for Prest-o-matic*

**Pays for itself  
in Four Weeks—  
Saves Handling Time,  
Operator Fatigue and  
Valuable Floor Space**



### JOB FACTS

**Company:**  
Prest-O-Matic Company

**Machine:**  
Burgmaster Bench Model  
Turret Drill

**Part:**  
Die Cast Aluminum Valve Body

**Lot Size:**  
Continuous — 220 per day

**Holding:**  
Special Fixture

**Special Attachments:**  
2 Burgmaster "3000" Tapping  
Heads

**Production Rate:**  
**Former Method:**  
4 Single Spindle Drills

**Former Production:**  
Valve Bodies — drill 8 —  
tap 3 holes — 100 per day

**Present Method:**  
Burgmaster Bench Model  
Turret Drill

**Present Production:**  
Valve Bodies — drill 8 —  
tap 3 holes — 220 per day

**Production Increase:**  
120%

**Other Advantages:**  
Less handling time, less  
operator fatigue, 75% less  
floor space

When the Prest-O-Matic Company, Santa Ana, California tooled up to drill 8 holes and tap 3 in their die-cast aluminum valve bodies, they selected a Burgmaster Bench Model Turret Drill to save 89% of original equipment cost, and increase production 120% over the output of 4 single spindle drill machines. Savings in production costs paid for the Burgmaster Bench Model in just 4 weeks of operation. Additional savings reported by Prest-O-Matic include less handling time, less operator fatigue, and a 75% saving in floor space.

*Send for Literature*

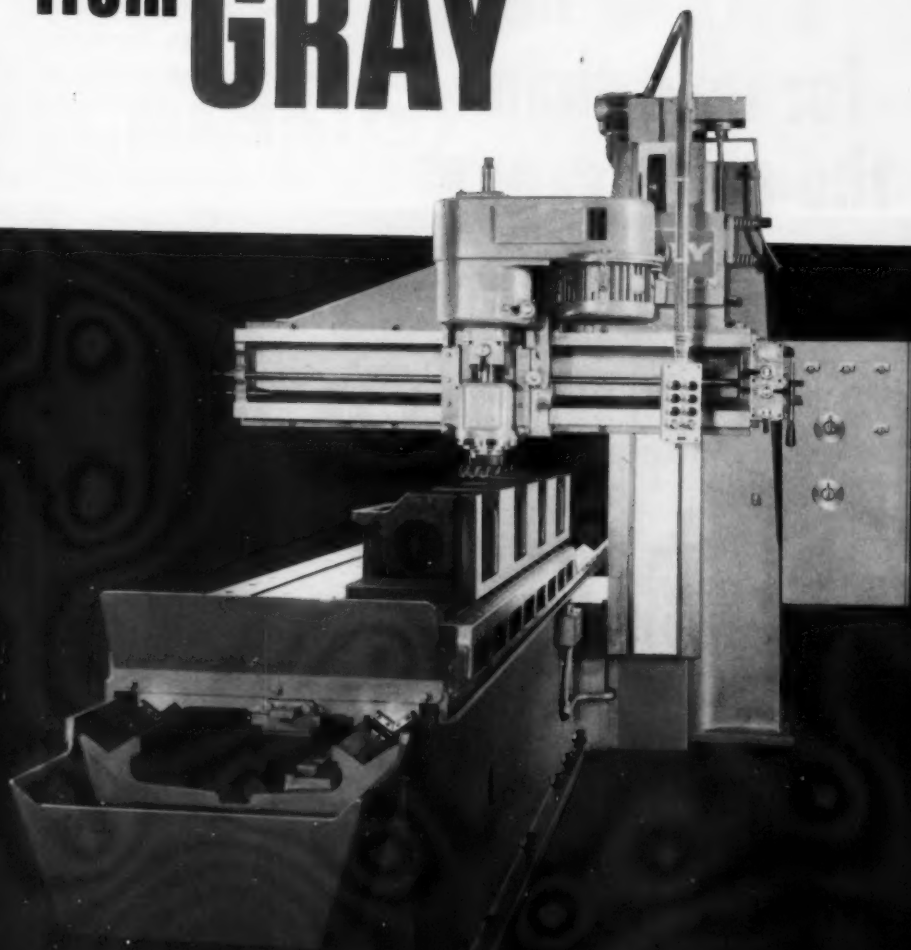


### BURGMASER CORPORATION

Small Tool Div., Burg Tool Manufacturing Co., Inc.  
13226 S. Figueroa St., Box 311, Gardena, Calif.  
Phone: FAcully 1-3510 Phone, wire or write Dept.OA

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# **NEW** budget class miller from **GRAY**

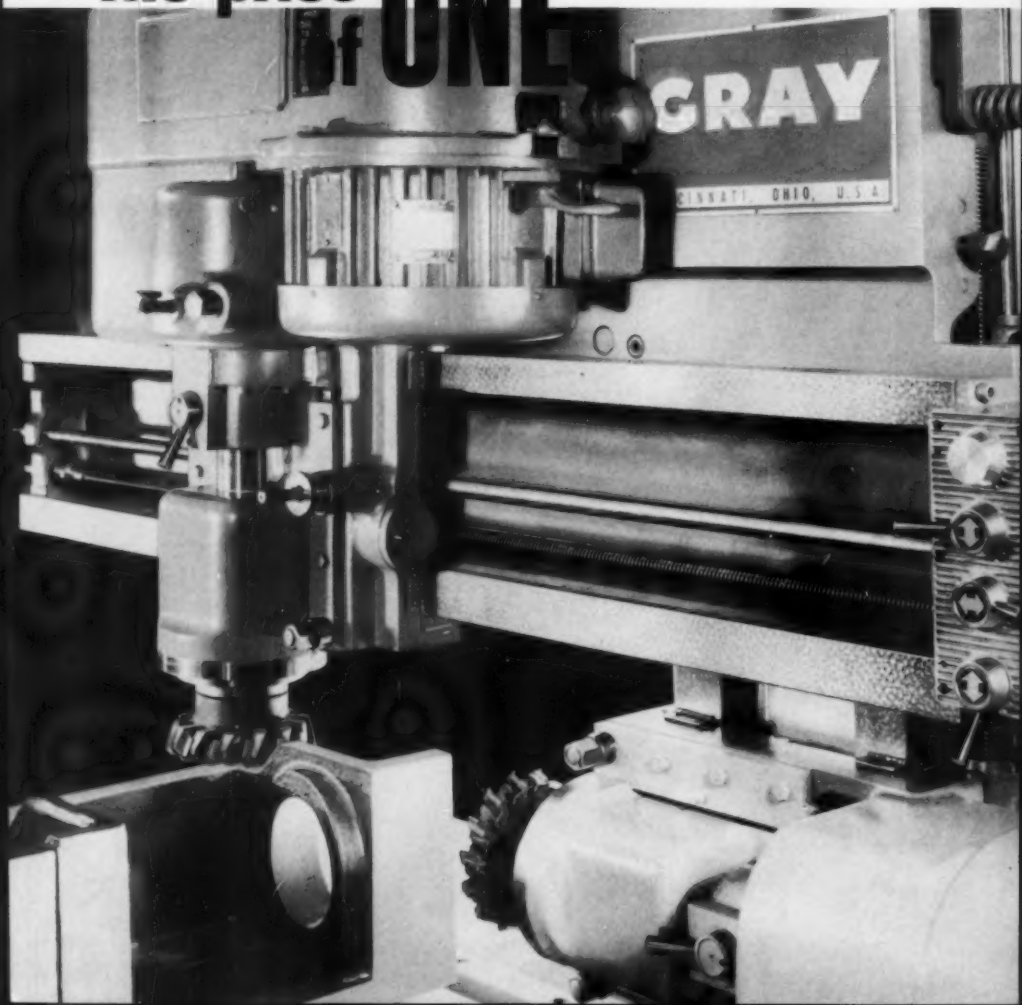


**\$33,700<sup>00</sup>**

ONE RAIL HEAD  
30" X 6" TABLE

# **TWO** heads for less than the price **ONE**

Most milling machines built with one spindle, cost more than the new Gray Handymill equipped with two spindles. Why ever consider high priced single spindle machines with fancy controls you don't need, when you can enjoy the low priced, versatile Gray.

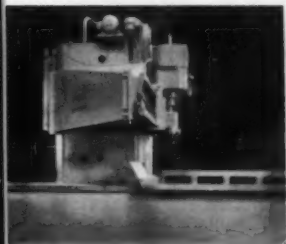




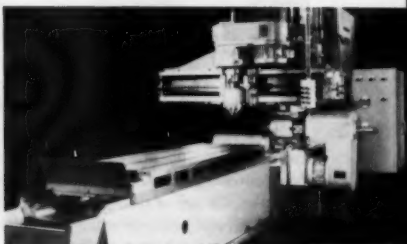
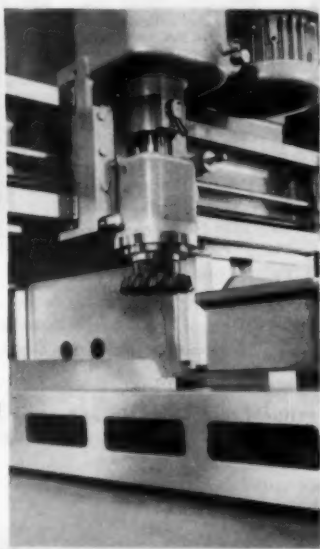
**CHIPS fly**  
**at the rate of**  
**4 1/2 lbs. per**  
**minute**

An outstanding performance, proof positive that the Gray Handymill has power to spare. Maximum chip removal, versatility, low burden factor minimum maintenance, all at the fabulously low price of \$33,700—(basic machine, one head) makes the Gray Handymill your best investment.

**SOLID GRAY CONSTRUCTION THROUGHOUT**



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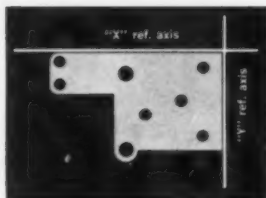
*Technical Bulletin No. 77R Available*

**THE G. A. GRAY CO.**  
**CINCINNATI 7, OHIO**

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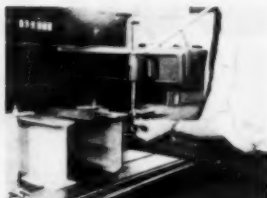
## Sheffield Ferranti FI-22 locates holes to within .001" faster than you can read this



1. The problem: locate the holes in this piece to within .001". Here's how it works.



2. Mount and clamp workpiece to table. Working range of table is 15" by 24".



3. Insert flat probe for aligning and locating reference edges of work piece.



4. Move spindle along "X" axis until probe touches reference edge, and push zeroing button. Repeat for "Y" axis.



5. Replace flat probe with suitable tapered probe. Interchangeable tips available for a wide range of hole sizes.



6. Move spindle over piece, and lower probe into hole. Numerals in readout panels will indicate exact hole position to .001".

You can see why the FI-22 is up to ten times faster than conventional surface plate and height gage inspection. On top of that, you can use it for lay-out scribing and center-punching. Write for Bulletin FI-22X and ask your Sheffield representative where you can see a demonstration of this machine.

The

**SHEFFIELD**

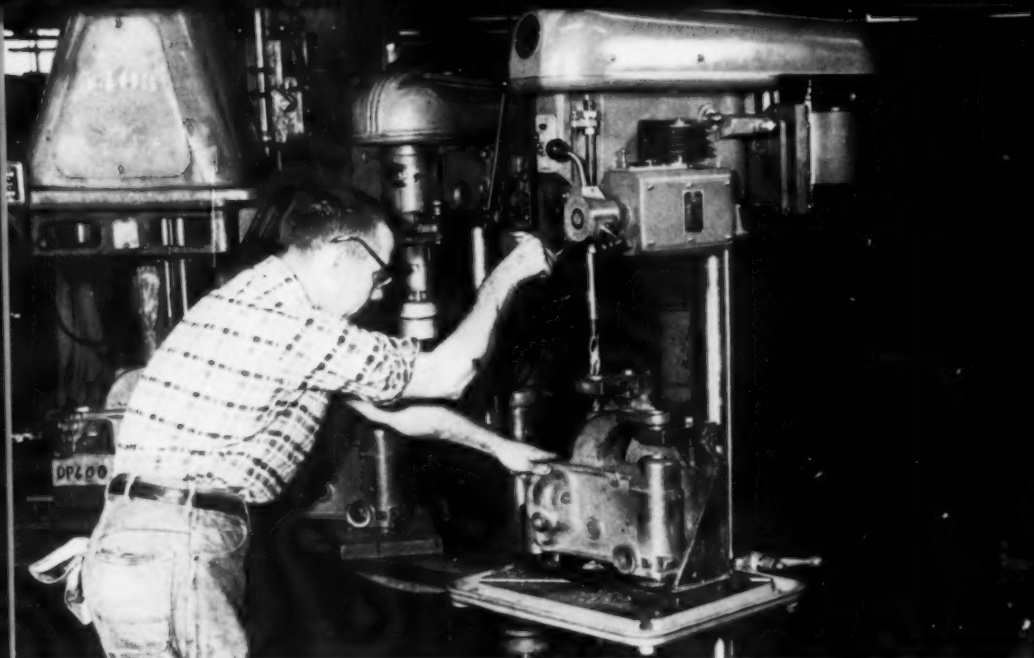
Corporation

Dayton 1, Ohio

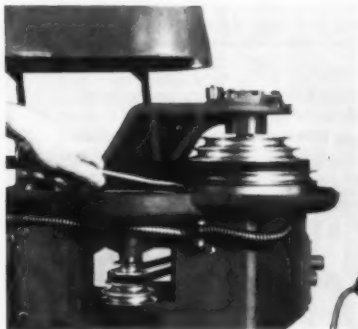
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## 2600 rpm or 110 rpm—you can do more with a Delta 20" geared pulley head drill press



All you have to do is turn a key to change from direct belt drive to gear drive on any one of the 28 models of this machine. The 20" geared pulley head drill presses can be used in manual as well as semi and fully automated set-ups.

**FREE BROCHURE** describes complete line of 20" drill presses in floor, bench, multiple spindle and overhead models. Write: Rockwell Manufacturing Company, Delta Power Tool Division, 610H N. Lexington Ave., Pittsburgh 8, Pa.

You can drill and tap large holes, do spot facing, reaming and counter-boring at extra slow speeds because these drill presses have planetary gear spindle pulleys which reduce spindle speeds and multiply torque. Hand feed models offer ten speeds, five in direct drive and five in gear drive, while eight speeds are standard on power feed models. Use of a longer than standard belt adds eight more speed selections to either model.

These rugged, flexible drill presses have the capacity to handle production metalworking jobs done by machines costing more than twice as much! See them in action and learn how they can help you cut drilling costs and improve drilling quality. Your Delta Industrial Distributor (listed under **TOOLS** or **MACHINE TOOLS** in the Yellow Pages) will give you the facts, figures, and an eye-opening demonstration.



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### *Here's a Team of Mills that Really Pay their Way*

When you can use South Bend Milling Machines for tool and die work and fill in free time with production runs, you've got an ideal situation. Here Metal Processors are drawing upon the two main capabilities of these machines—accuracy for exacting work and productivity for manufacturing operations.

"Double lives" are not unusual for South Bend Mills as they are readily adaptable to wide varieties of work with a minimum of effort and no sacrifice in accuracy because

of such features as these:

- Head rotates 360° vertically . . . mills, bores, drills and reams at any angle
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Prices start at \$1829 less power feeds.

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ON THE PRODUCTION LINE"**

## JARVIS UNIVERSAL JOINT MULTIPLE SPINDLE HEADS

\* For example, you can add to the basic head one or more of 20 optional accessories (such as Spindle Assemblies, Spindle Cluster Plate, Base Plate, Guide Rods, etc.) to meet the requirements of a particular job.

With Jarvis Heads you have a greater selection of parts and accessories. A buy-only-what-you-need, custom-built head without having to pay the high cost of regular custom designed heads.

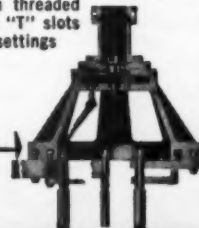
Universal joints are of an advanced structural design which feature: low deflection rate; superior fatigue resistance; greater overload capacity and longer life. Joints have a snap-on feature and can be slipped off the spindle without use of tools.



### EXCLUSIVE JARVIS FEATURES

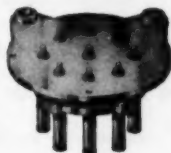
Cut-away view (below) reveals high strength, light weight aluminum alloy castings, heavily ribbed for durability; gears and spindle drivers run in ball bearings, have more than thrust load capacities; idler gears mounted on heavy duty needle bearings running on specially heat treated steel studs; adjustable outrigger arms locked in position with threaded studs located in double "T" slots for positive positional settings

**DOUBLE "T" SLOTS,  
NOT FOUND ON  
MOST OTHER HEADS,  
ADD RIGIDITY**



### NO NEED TO INVENTORY SEVERAL FIXED HEADS

Head converts easily to a fixed head by adding a Jarvis Spindle Cluster Plate (shown below) which can be jig bored, by you or by us, to locate spindles to suit hole spacing required. Cluster Plates will aid in reducing setup time and will assure correct setup each time.



### SEND TODAY FOR COMPLETE DETAILS

**JARVIS CORPORATION,**  
40 Pease Ave., Middletown, Connecticut  
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Name \_\_\_\_\_ Title \_\_\_\_\_  
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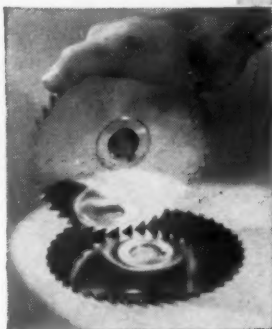


**COLUMBUS DIE-TOOL & MACHINE CO.**  
**P. O. BOX 750 • COLUMBUS, OHIO**

# NEW Brown & Sharpe Sawperior

GREATEST ADVANCE IN  
SLITTING SAWS IN  
50 YEARS!

A super-finish  
saw so tough  
it can't scratch  
itself.



The mirror-like finish of new B&S "Sawperior" slitting saws mark 3 new developments that more than double production and make other saws virtually obsolete!

**NEW** Alloy High Speed Steel for Longer Life.

**NEW** Tooth Design for Fast Free Cutting!

**NEW** Super-Finish prevents Chips Seizing and Galling!



## Brown & Sharpe



### PRODUCTION BENEFITS

Shop tests prove the new tooth geometry and mirror-like finish give up to 4 times as much slitting production between sharpenings.

Super finish on sides permits use of less concavity or side clearance thereby providing a stronger saw section and a stiffer, more accurate saw.

Smooth side finish resists scratching, resists corrosive action of coolants and rust.

New saw design requires less milling machine power thereby allowing heavier cuts without strain or chatter.

New saw geometry and super finish sides give smoother surface finish in cut.

*For that **EXTRA** Edge in Production!*

Send for B&S Cutting  
Tool Condensalog ...



Cutting Tool Division  
Brown & Sharpe Mfg. Co.  
Providence 1, Rhode Island



## NEW ARMSTRONG CATALOG

### *Quality Tools for Industry*

New ARMSTRONG General Catalog #700, showing the complete ARMSTRONG Line, has been released. This catalog lists approximately 330 tools that have not been included in previous ARMSTRONG Catalogs.

Additions have been made in the following categories:

**Tool Holders**  
**Set-Up-and-Hold-Down Tools**  
**Tool Bits**  
**Wrenches**  
**Ratchet Wrenches and Sockets**  
**Miscellaneous Hand Tools**  
**Pipe Tools**

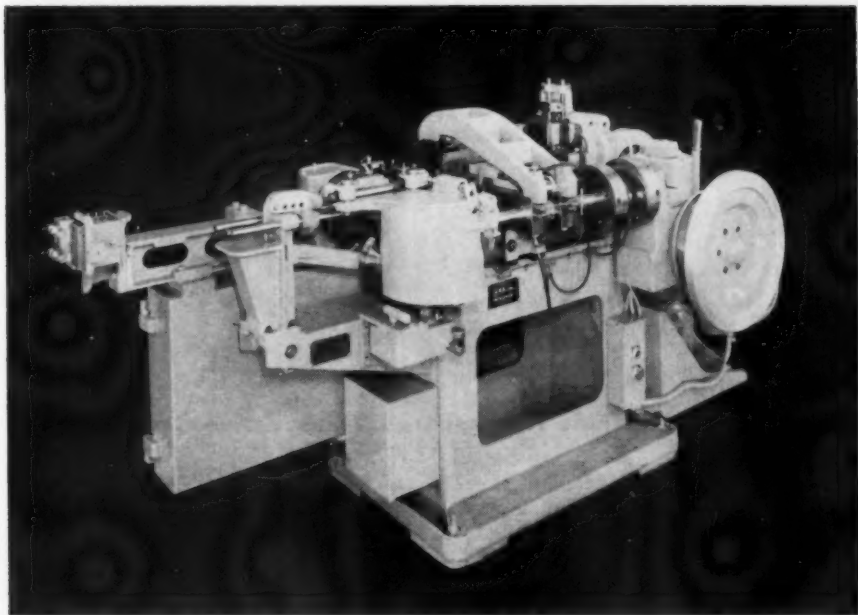
Get your free ARMSTRONG Catalog No. 700 showing these important additions, as well as the thousands of other tools included in the ARMSTRONG Line. The catalog is a necessity for anyone who uses or buys hand tools or shop tools. Write direct, or phone your local ARMSTRONG Distributor (who has a supply of new catalogs on hand). If you do not know which distributor in your area carries the ARMSTRONG Line, we will be glad to supply this information upon request.

**ARMSTRONG BROS. TOOL CO.** 5208 W. ARMSTRONG AVE.  
CHICAGO 46, ILLINOIS

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# BB

## What's New in Metalworking



### Symmetrical High-Speed Multi-Slide for Formed Stampings

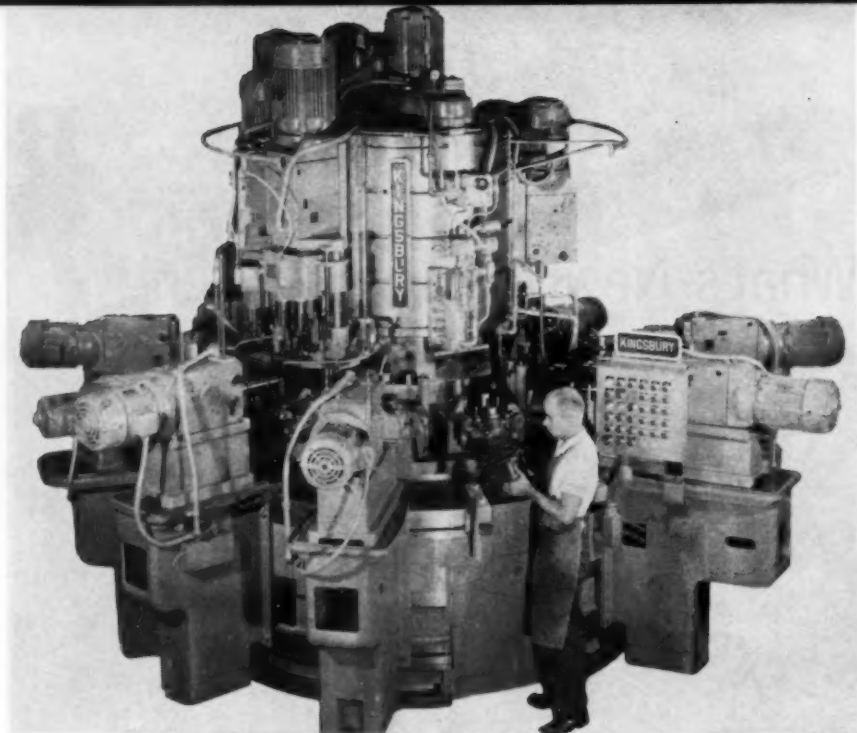
U. S. Tool Co., Inc., has developed a high-speed multi-slide machine that is designed to reduce the piece-part cost of formed stampings. Outputs of 400 spm are attainable.

Die heads are reversible and can be used from either front or back, giving the advantages of versatility, both in operation and in the designing of tools. It is equipped with specially constructed forming slides and a high-speed positive-grip feed.

Standard equipment includes: one die head with cam; back plate; tie bar; four high-speed forming slides with cams; stripper mechanism with cam; high-speed, positive-grip feed; stock check; stock straightener; brake; automatic lubrication system; and 5-hp. variable-speed drive with outputs from 80 to 400 spm.

U. S. Tool Co., Inc., Ampere (East Orange), N.J.

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### Center Column Machine for Cast-Iron Transmission Cases

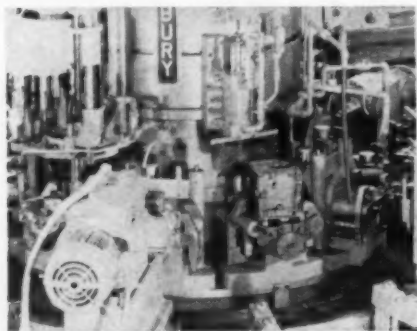
Sixteen units with forty-four spindles that drill, countersink, counterbore, ream, and tap at a gross rate of 79 parts per hour have been developed by Kingsbury Machine Tool Corp. A 63" index table holds ten work fixtures, five for the first chucking and five for the second, in alternate positions. A piece

is finished with every other index.

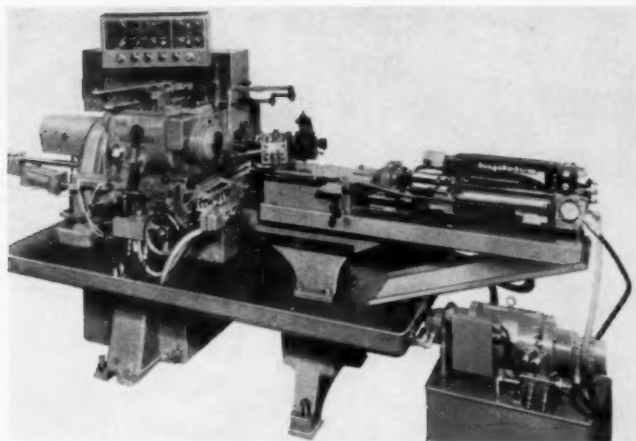
In each fixture two arms clamp the workpiece down against the rest surface. Two holes in each underneath surface serve as radial locating points. To actuate the clamping arms, a spring-loaded ram works through an equalizing cam.

Each operating unit cycles on alternate indexes by means of a selective trip. In the first chucking, two vertical units finish five holes. Seven horizontal units finish two holes. Five of these seven units operate on a deep hole and are mounted to the right of the radial center lines. In the second chucking, five vertical units finish seven holes, and two horizontal units operate on eight holes.

Kingsbury Machine Tool Corp., Keene, N.H.



Use postpaid card. Circle No. 74



### Customized Turret Lathes

Acme Industrial is now providing ram-type turret lathes and special machinery that is designed, built, and custom-automated to specific requirements, allowing shops to modernize machinery to its own production. Used equipment can be provided or equipment now in use can be rebuilt to incorporate automated operations.

Shown is a hydraulic ram-type turret lathe with Acme's automated unit called a Hy-Drive. It is the primary equipment used to automate existing machines. It provides automated conventional operations such as deep hole drilling, back feed skip boring control, tapping, and threading.

Acme Industrial Co., 200 N. Laflin St., Chicago 7, Ill.

Use postpaid card. Circle No. 196

### Magnetic Sheet Support For Power Squaring Shears

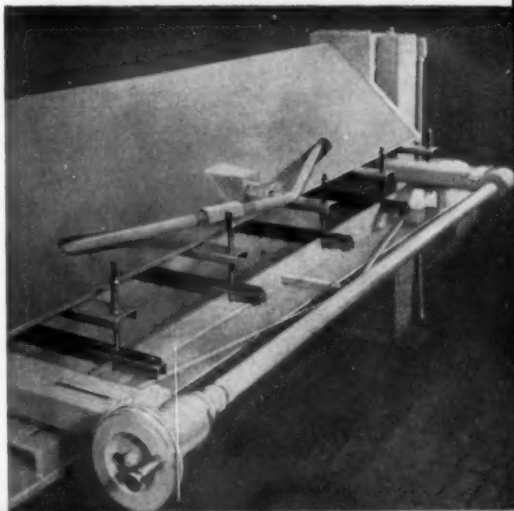
Accurate gaging of wide, thin, flexible sheets on power squaring shears is now claimed to be assured by a magnetic sheet support introduced by Niagara Machine & Tool Works.

Designed for use with ferrous materials 16 gage and lighter, the support consists of several sets of magnetized rollers attached to the crosshead of the squaring shear. These rollers grip the material and hold it level to prevent drooping as the sheet passes from the rear of the bed to the back gage.

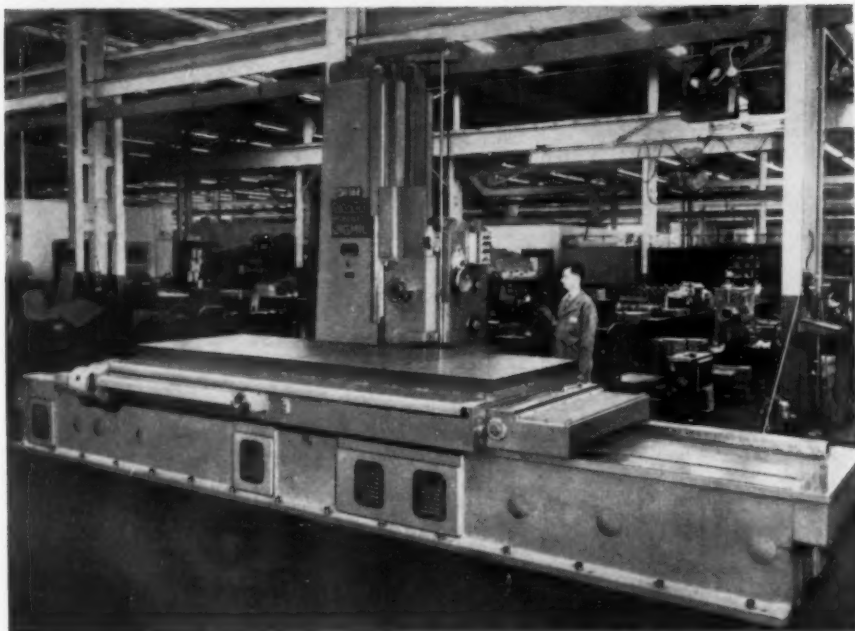
Holding power of the magnetized rollers is just enough to support the sheet until it is cut. Then the severed portion falls free.

Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N.Y.

Use postpaid card. Circle No. 197



## Horizontal Boring Machine With Accuracy of 0.0001"



A 37-ton horizontal boring machine is now being produced by DeVlieg Machine Co. Called a 5H-144 Spiramatic Jigmil, it has a 5" spindle.

In final assembly of the machine, it is flat to within tenths, and a basic accuracy of 0.0001 ipf for straightness and alignment on all working surfaces.

The vertical movement of the spindle head is 6', and its 50" wide table pro-

vides a 12' travel horizontally. It can be provided with tables of the same width for 72", 96", or 120" horizontal travel.

Direct power to the spindle of the machine is provided by a 20 hp motor. Range of the spindle bar travel is 24".

DeVlieg Machine Co., Royal Oak, Michigan.

Use postpaid card. Circle No. 75

## Drill Point Machine Has Scroll-Type Chuck

Oliver Instrument Co. has announced a drill pointing machine, designated model 600, that features a scroll-type chuck. It is mounted in anti-friction bearings and is complete with an automatic recirculating lubrication system.

The chuck is controlled by a quick-acting positive drive which eliminates

the former telescoping universal joints.

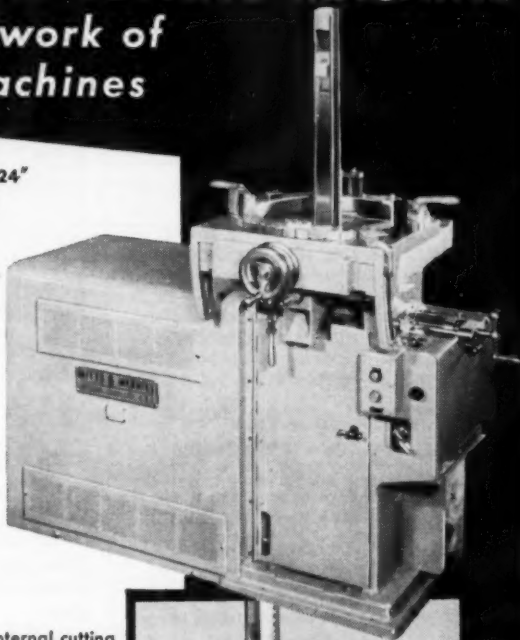
All controls are grouped at the front of the machine. This drill pointer is available as a dry type; a wet type, for use with very large drills or where excessive stock removal is required; or as an "Airdraulic" type, which is fully automatic after setup.

The unit will grind right hand drills in the two, three, or four-flute style

# AMAZING NEW **M&M** KEYSEATER AND VERTICAL CUTTING MACHINE

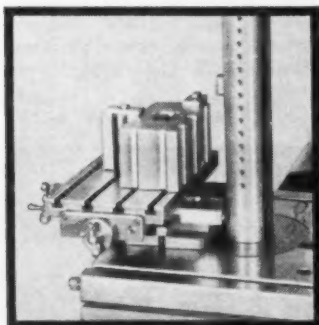
*does the work of  
many machines*

In addition to a keyseater that cuts internal keyways up to 3" wide x 24" long, the new hydraulic M & M is a handy tool room machine and can be easily adapted to special production jobs other than keyways. A wide variety of internal or external cuts, serrations, grooves and teeth can be rapidly made on this machine. With a combination tilting table and index table (shown on machine at right) straight or tapered bores and accurately spaced multiple keyways or splines may be cut at any degree of the circle. Send us prints of your cutting problems.

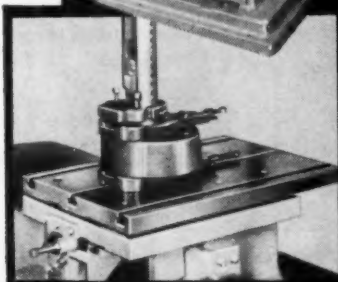


Right: Set-up for internal cutting

Below: Set-up for external cutting



106

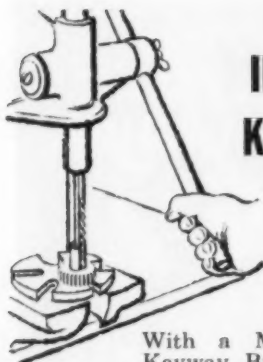


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## **M&M** KEYSEATERS AND VERTICAL CUTTING MACHINES

**MITTS & MERRILL** • 1015 S. WATER ST. • SAGINAW, MICHIGAN

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## INSTANT KEYWAYS

With a Minute Man® Keyway Broach you can cut a keyway, by hand, in an arbor press in *one minute* for as little as *one cent*. Available individually or in kits complete with broaches, bushings, shims and key-stock. For keyways from  $\frac{1}{16}$ " to 1" in any bore  $\frac{1}{4}$ " to 3".



A B C

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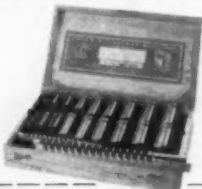
For finishing  $\frac{1}{16}$ " to 1" square holes in one pass in cast or drilled bore. (32nd sizes, too)

#### (B) HEXAGON BROACHES

For finishing  $\frac{1}{16}$ " to  $\frac{1}{4}$ " hexagon holes in one pass in cast or drilled bore.

#### (C) ROUND BROACHES

For finishing  $\frac{1}{16}$ " to 1" round holes in one pass in drilled bore.



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MAIL FREE BROACH CATALOG AND PRICE LIST T describing Square, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

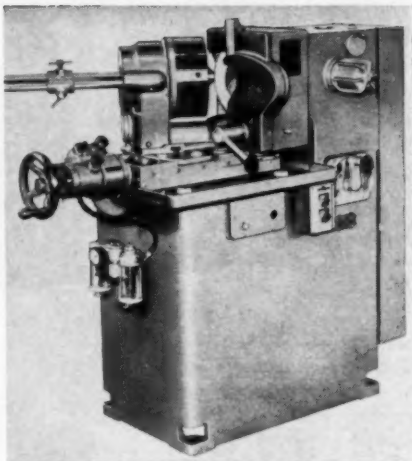
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in a size range of  $\frac{1}{2}$ " to 3" diameters.  
Oliver Instrument Co., Adrian, Mich.

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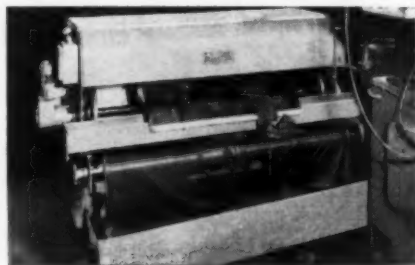
### Two-Stage Coolant Cleaning

A filtration unit that removes all types of contamination from coolants is being marketed by Barnes Drill Co. This two-stage unit comes in five models with capacities from  $\frac{1}{2}$  to 60 gpm.

In the first stage, dirty coolant flows through a magnetic field that removes ferrous particles. The coolant then passes through a filter medium which removes the nonferrous contaminations.

Barnes Drill Co., 852 Chestnut St., Rockford, Ill.

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233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248
249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264
265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296
297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312
313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328
329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344
345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376
377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392
393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408
409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424
425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456
457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472
473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488
489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504
505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536
537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552

Inside Front Cover Inside Back Cover Back Cover

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1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

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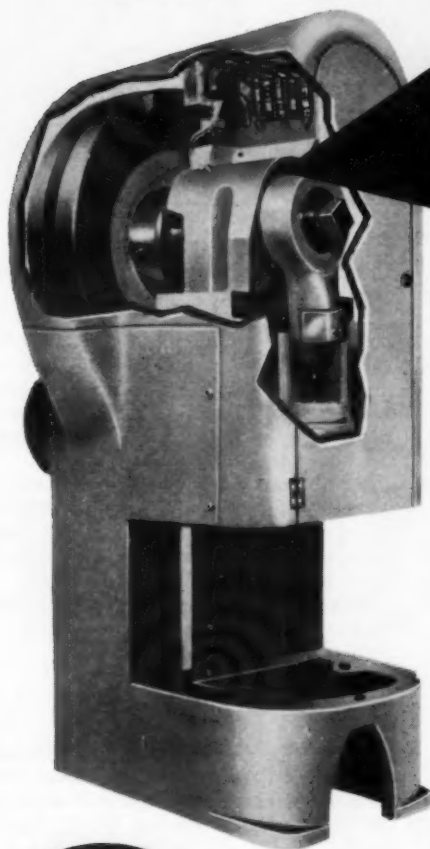


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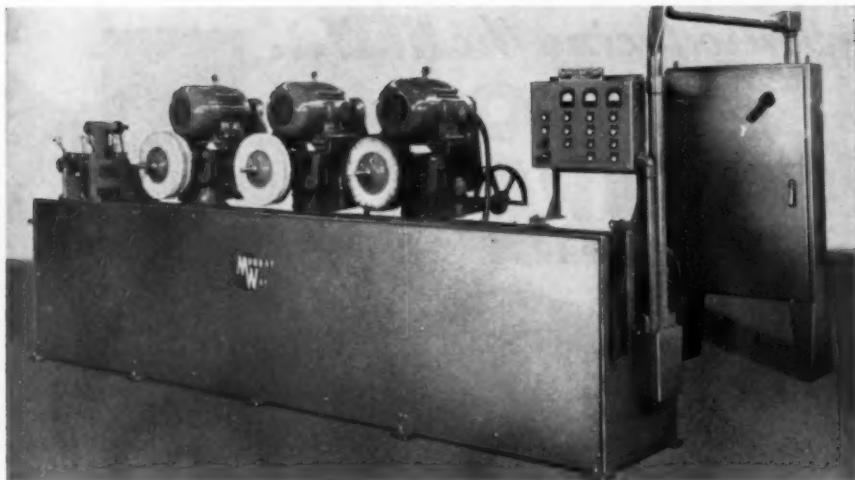
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### Machine Tests Finishing Method and Standards

Production speeds, work pressures, and feed rates for polishing and buffing operations can be determined in advance of actual production runs by a comparator machine built by Murray-Way Corp.

This unit can also be used to test work wheels, hp usage, buffing and polishing compounds, and production parts or materials to assure that they meet standard specifications.

A conveyor moves the sample materials past a scouring head and three buffing heads. Wheel pressure is adjustable and friction-free. Once wheel pressure is selected, it remains constant. The scouring head uniformly

roughens the surface of sample materials for reuse in the testing.

Heads are adjustable horizontally across the conveyor in a 5" range. Elevation can be screw-thread adjusted in an 8" range, and vertical float has a 6" range. Heads can be angularly positioned up to 45° either side of center in a horizontal plane.

Also featured are: selective pneumatic wheel lift-off, adjustable conveyor speed, and swing-out of scouring head when not required. Floor space requirement is 5½' x 15'.

Murray-Way Corp., P.O. Box 180, Birmingham, Mich.

Use postpaid card. Circle No. 79

### Switch Actuators

Bayside Timers has announced two switch actuators which allow "on" and "off" from zero through 350°. A nylon wheel engages the switch roller. Two independently adjustable arms are mounted on the motor shaft. When the front arm engages a projecting pin on the wheel, the wheel moves one station and detents the switch closed where it

remains until the rear arm engages another pin on the rear of the wheel. The actuator arms can be adjusted to allow the switch to be closed briefly, open briefly, or for any setting between for each revolution.

Bayside Timers, 43-39 162nd St., Flushing 58, N.Y.

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**For THROWAWAY-INSERTS and TOOLS ... get to know**  
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**All sizes and types of throwaway-inserts: HSS; cast alloy; carbide; ceramic. Send prints for quotations on Negative and Positive rake inserts.**

**ONE FOR ALL ... ALL FROM ONE**

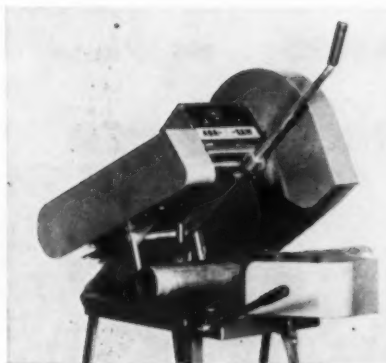
The wise way to buy Carbide, High Speed Steel, Cast Alloy and Ceramic Throwaway-Inserts, and Tool Holders, Milling Cutters, and Boring Bars is to buy from one knowledgeable source. Viking tool engineers know the applications of not merely one of these items, but of all of them as they so vitally relate to each other in order to obtain maximum cutting performance with minimum loss in time and materials. Because Viking engineers are pioneers in the throwaway-insert and tool industry, they are uniquely able to recommend the right tool and/or insert for your particular need. They are at your service.

**ASK FOR AN INTRODUCTION**



25 Nichols Road, Shelton, Connecticut

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### Abrasive Sawing Machine

An abrasive sawing machine that employs all sizes of abrasive wheels up to a maximum of 20" has been introduced by Collins Machinery. It operates with motors up to 10 hp. Cuts

up to 6" pipe and shapes, and 4" solids on ferrous and nonferrous materials can be made on this machine.

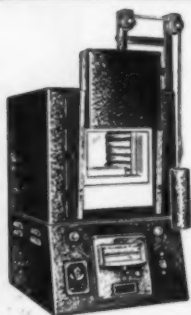
It can be mounted on a bench with lever controlled chain vise, or on a stand with foot-pedal assembly, leaving the operator with both hands free.

Collins Machinery Corp., 955 Monterey Pass Road, Monterey Park, Calif.

Use postpaid card. Circle No. 81

### Shockwave Compaction Machine

The Branford Co. has introduced a process for fabricating powdered metal, ceramic and cermet components. This process utilizes a shockwave compaction machine as the source for the impact force. This unit can deliver 10 times the kinetic energy of a conventional vibrator of comparable size, according to the company. Accelerations greater than 20,000g have been induced



Request literature on complete line of Huppert furnaces and ovens.

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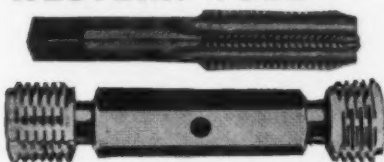
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SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
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0	70-72-76-80	1/2	12-13-14-16-18-20-24-27-28-32-36-40	1-13/16	6-10-12-14-16-18-20-24-32
1	48-56-64-72-80-90	9/16	12-14-16-18-20-24-27-28-32-36-40	1-7/8	5-8-10-12-14-16-18-20-24
2	48-52-54-56-64-72-80	5/8	10-11-12-14-16-18-20-24-27-28-32-36-40	1-15/16	5-6-8-10-12-14-16-18-20
3	40-44-46-48-56-60-64	11/16	10-11-12-14-16-18-20-24-27-28-32-40	2	3-10-12-14-16-18-20
4	32-36-40-48-56-60-64	3/4	10-11-12-14-16-18-20-24-27-28-30-32-36-40	2-1/16	12-14-16
5	30-32-36-40-44-48-56-64-80	13/16	10-12-14-16-18-20-24-27-32	2-1/8	8-10-12-14-16-18-20
6	30-32-36-40-48-56-60-64-72-80	7/8	9-10-12-14-16-18-20-24-27-28-32-40	2-3/16	10-12-14-16
7	30-32-36-40-48-64	15/16	8-9-10-12-14-16-18-20-24-27-32-40	2-1/4	4 1/2-8-10-12-14-16-18
8	24-30-36-40-44-48-56-60-64-80	1	8-10-12-14-16-18-20-24-27-32-36-40	2-5/16	12-14-16-18
9	24-28-32-36-40	1-1/16	10-12-14-16-18-20-24-27-32	2-3/8	10-12-14-16-18
10	28-30-36-40-48-56-60-64	1-1/8	7-8-10-12-14-16-18-20-24-27-32-36	2-1/2	4-8-10-12-14-16-18
12	20-22-24-28-30-32-36-40-56-60	1-3/16	8-10-12-14-16-18-20-24-27-32	2-9/16	12-14
14	20-24-28-32-40	1-1/4	7-8-10-12-14-16-18-20-24-27-32	2-5/8	8-10-12-14-16-18
1-1/16	60-64-72	1-5/16	6-8-10-12-14-16-18-20-24-27-32	2-3/4	4-8-10-12-14-16
5/64	72	1-3/8	6-8-10-12-14-16-18-20-24-27-32	2-7/8	8-10-12-14-16
3/32	36-48	1-7/16	8-10-12-14-16-18-20-24-27-32	3	4-8-10-12-14-16
1/8	32-36-40-44-48	1-1/2	6-8-10-12-14-16-18-20-24-27-32	3-1/4	8-10-12-14-16
5/32	32-36-38-40-44-48	1-5/8	12-14-16-18-20-24-27-32	3-1/2	8-10-12-14-16
3/16	20-24-28-32-36-40-48	1-3/4	5 1/2-6-8-10-12-14-16-18-20-24	3-3/4	4-8-10-12-14
7/32	20-24-28-32-36-40	1-11/16	6-8-10-12-14-16-18-20-24	4	8-10-12
1/4	14-16-18-22-24-28-27-28-30-32-36-40-48-56-64				
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11/32	20-28-32-40-48				
3/8	12-13-14-16-20-22-27-28-30-32-36-40-48				
13/32	16-20-24-32				
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2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-10-20-24	1-9/16	8-10-12-16-18-20
4	82-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	1	8-12-14-16-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12	2	4 1/2-10-12
5/16	18-20-24-28-32	1-1/4	7-12-16-18		

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H. S. Extension drills—Special Reamers and Special  
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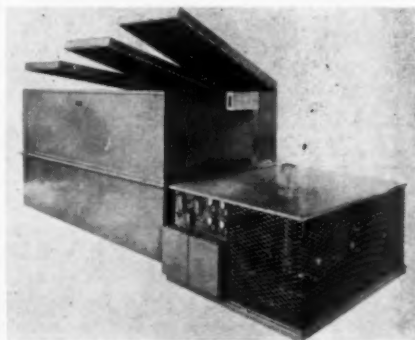
in powder specimens to achieve high densifications. It has an operating range from zero to 500 impacts per min.

The Branford Co., 132 Glen St., New Britain, Conn.

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**Recessed Chilling Chamber For  
Low Temperature Processing**

Designed for metallurgical processing of ferrous and nonferrous aircraft quality materials at  $-110^{\circ}\text{F}$ , Cincinnati Sub Zero Products' 250 cu. ft. chilling chamber has been engineered for recessed installation. The stainless steel chamber, which measures 120" long,



MACHINE and TOOL BLUE BOOK

60" wide, and 60" deep, will chill  $\frac{1}{2}$  ton of steel from ambient to  $-110^{\circ}$  in 2 hours. It has been constructed for continuous operation. Even temperature distribution is accomplished by means of two 16" fans which are flush-mounted in the chamber backwall.

Cincinnati Sub Zero Products, 3932 Reading Road, Cincinnati 29, Ohio.

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### Pneumatic Press

Howard International, Inc., is introducing a French pneumatic press that is said to provide distortion and breakage-free assembly and working of small parts.

Called a PH-3, this press has up-and-down stroke speeds that are independently controlled.

Howard International, Inc., 350 5th Ave., New York 1, N.Y.



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### Slip or Cartridge Spindles

Slip or cartridge spindles are now offered on Zagar multiple spindle gearless heads for drilling, reaming, and tapping. The plate into which the spindles are inserted is pre-bored to accept spindle varying patterns.

The absence of gears and joints permits a comparatively reduced over-all height of the head. A minimum of spindle extension is required, thus making an over-all height of  $7\frac{3}{4}$ " possible in



### Gaertner 2" x 4" toolmaker's microscope for measurement to 0.0001" and 1 minute of arc

You'll find the Gaertner Toolmaker's Microscope as part of the standard inspection equipment in the ideally-equipped shop or lab. It will do the work of many single-purpose measuring and inspection instruments with greater convenience and accuracy.

Full 2" precision lead screws permit measurements over 2" x 2" of the instrument's range without the use of gage blocks or rods.

Independent and combined rotation of the cross hairs in the protractor ocular speed up measurements and simplify measuring procedure. The instrument's versatility may be increased through the addition of such accessories as thread and radius templates, camera and spotting attachments, fine motion focus, direct-reading counters, and interchangeable optics for varying magnification and field.

Write for Bulletin 147-56

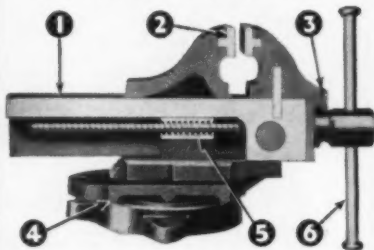
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SCIENTIFIC CORPORATION

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1. exclusive steel slide milled from solid bar
2. replaceable jaw inserts held by top-entering pins
3. outside screw retainer



4. positive locking 360° swivel base
5. longest wearing alloy steel nut
6. one-piece non-pinch handle

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Simplex industrial vises give you the advantage of solid steel slides, jaws, nuts for maximum strength and ruggedness long after their modest cost is written off. Line includes milling machine, pipe, sheet metal and other models.

# Desmond Simplex

**The Desmond-Stephan Mfg. Co.**  
**Urbana, Ohio**

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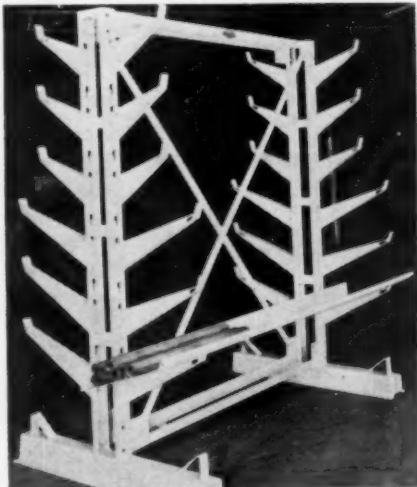
the smallest head size. Four standard head sizes cover maximum bolt circle areas of 6½", 10½", 12½", and 15½". Spindle sizes are 1¼" and 1½", with capacity up to 9/16" in steel. The standard heads are mountable on round or flange-type quill machines.

Zagar Inc., 23900 Lakeland Blvd.,  
Cleveland 23, Ohio.

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### Adjustable Arm Storage Rack

An adjustable arm cantilever rack has been announced by Jarke Mfg. Co. Columns on this rack are constructed



of structural steel welded to formed plate bases and joined by cross and X-bracing to set up stable and rigid units. Keyway slots on the column faces provide 4" adjustable spacing for the arms.

Complete, self-standing units are available in either single or double-arm construction with choice of 12" or 16" arm. Twelve gage pans designed to span two arms are available to accommodate short length pipe, rod, or small parts.

Jarke Mfg. Co., 633 Howard St.,  
Chicago 48, Ill.

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High-speed tables . . . 10 to 70 FPM cross feed .005" to .250" with rapid traverse . . . hardened and ground lead screws . . . chrome plated table ways (at extra cost) . . . direct motor driven spindles.

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6" x 18" working surface, 16½" height under a 7" wheel. Jobs set up quickly for tool room or production grinding. 1 HP 3600 RPM spindle drives 7" grinding wheel.

#### No. 17-H

10" x 16" working surface for die block work requiring wide cross feed, or general tool room and production work. 2 HP 1750 RPM spindle drives 12" grinding wheel for heavy stock removal.

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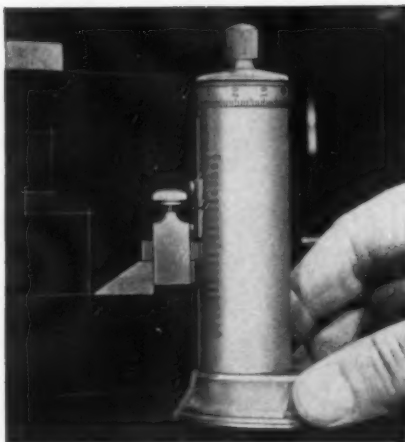
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BULLETIN B881



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Easy-to-read micrometer gage scribes like a vernier height gage. Measures up to 11" with risers, with accuracy of  $\pm .0005$ ". Machine cut gradations in .100" on barrel, .001" on head. Dial indicator attaches for quick measuring between holes and surfaces. All working parts are hardened and ground, adjustable for wear. Glare-free satin-chrome finish. Comes complete with carbide scribe, indicator holder and case.

Micro-Height "2." Reads  
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Immediate delivery from stock. Write for name of your nearest dealer.



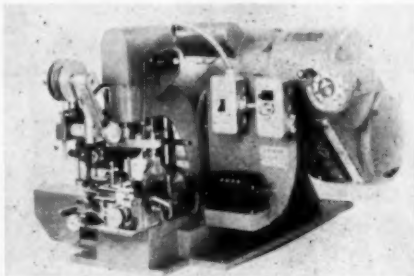
2 COMMERCE ST.  
CHATHAM,  
NEW JERSEY  
MERCURY 5-7787

## Tube Marking Machine

An automatic tube marking machine that feeds, marks, and cuts all types of flexible plastic tubing has been introduced by Acromark Co. Called a model ETMA, it is designed to produce a marker cut to accurate length with the imprints centered and permanently impressed on the plastic. It uses a dry-heat bond marking process which eliminates ink system problems.

The variable-speed drive permits production of 60 to 190 pieces per min., depending on size and length. The feed is adjustable for lengths ranging  $\frac{3}{8}$ " to 2".

Cutters have replaceable carbide cutting faces and adjustable shear pressure. A predetermined automatic counter



stops the machine when a preset count is reached.

The Acromark Co., 15 Morrell St., Elizabeth 4, N.J.

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## Machine Turns Elliptic Form, True Diameter, Simultaneously

A method for turning aluminum piston skirts to an elliptic form, while at the same time turning the ring lands to a true diameter, has been introduced by Ex-Cell-O Corp. The job is performed on a single-end model 751 boring machine having two spindles and using drum cams and tooling.

Each cam, ground to the elliptic form, is mounted integral with each workholding fixture on the spindles. Tools

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**ASSEMBLY & FASTENER DIRECTORY**

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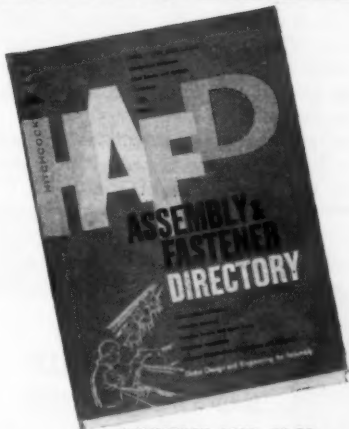
This new Hitchcock Directory will put at your fingertips the most complete listing of products and suppliers ever compiled serving the assembly field. Suppliers' names, addresses, products and services will be **sectionalized by assembly methods**. These include mechanical fasteners, spring and wire forms, hardware, resistance welding, brazing and soldering, bonding, seals, portable power and hand tools, assembly equipment and fastener manufacturing equipment and materials.

Valuable engineering data on standards, finishes, strength of joints, torque, materials and other subjects will be included in tables and chart form.

A special trade name section will list products commonly known by their trade names, describe the products and identify the manufacturer. Another section on associations will contain an up-to-date list of important trade and professional groups serving the industry.

The Directory will be bound in hard covers, measures 8½ x 11½ inches, and is planned to answer many questions with which you are confronted in day-to-day assembly problems.

Reserve your copy now at the special pre-publication price of \$7.50, \$2.50 under the \$10.00 cost at publication. Early orders are assured the first copies off the press in September. Be sure to take advantage of this pre-publication savings and reserve your copy with the handy coupon at the right.



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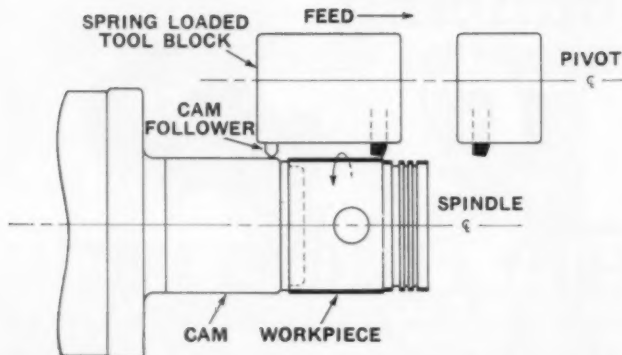
TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

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PD-1-43-00



at the work stations are held in two independently pivoted and hydraulically controlled tool blocks mounted side-by-side. The left tool blocks, designed to machine the elliptic skirts, are spring-loaded and each is provided with a cam follower.

The machine cycle begins as the tool pivots hydraulically towards the workpieces, the machine table being in the

start position close to the spindles. The cam followers contact the cams and the ring land cutting tools feed to depth. As the table feeds to the right, the cam controlled tools turn the elliptic skirt, while the rigidly mounted tools turn the ring land diameter.

Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

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## COMBINED DRILLS and COUNTERSINKS

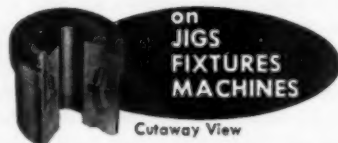


• Both old and new series carried in stock for immediate delivery. Finest high speed steel. Ground spiral flutes. New standard simplifies and improves size progression. New comparison chart mailed on request. Shows new standard sizes—both plain and bell type. Specials to your blue prints. We also stock Keyseat Cutters, Arber Type Cutters, Center Reamers, Lathe Mandrels, T-Slot Cutters and Long Series Combined Drills.

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 Warehouse: 1300 S. Soto St.,  
 Los Angeles 23, Calif.

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## REPLACE SOLID BUSHINGS with JERGENS ADJUSTABLE BEARINGS



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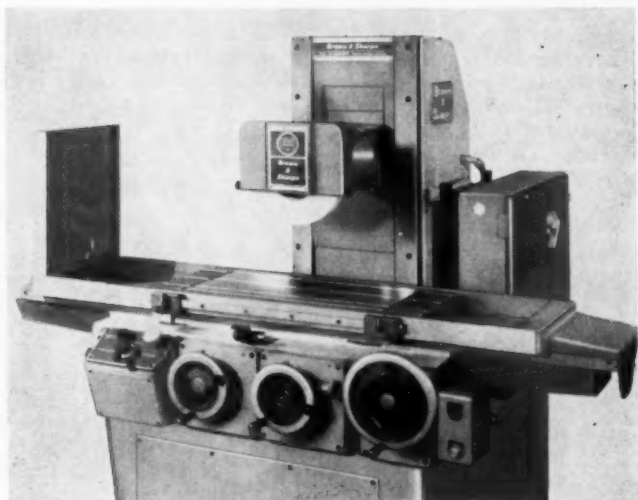
- Increase Speeds, Feeds, 200%
- Reduce Tool Breakage
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Get time, tool, and money-saving advantages by replacing solid bushings with Jergens adjustable roller bearing units. Available for 1/2" to 6" shafts or with straight roller bearings where space is a factor in 1/2" to 2" shaft size. Write for information.

## DONLEY PRODUCTS, INC.

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MACHINE and TOOL BLUE BOOK



### Surface Grinding Machine

A 12" x 24" surface grinding machine has been introduced by Brown &

Sharpe. This machine was designed for use in tool and die shops where its table, which is wide in proportion to



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This stamp made good, clear impressions after 30,000 hammer blows!



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August, 1961



MODEL  
**UBG-15**

**FLEXIBLE  
ABRASIVE BELT  
GRINDER**

*"The All Purpose  
Machine"*



- CONTACT
- FLEXIBLE
- PLATEN
- CONTOUR

**FLOOR OR  
BENCH TYPE**

*Hammond Machinery Builders*

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its length, can perform accurate die grinding. The machine is also suited for general production work due to its automatic operation and by the availability of an automatic slot and surface grinding attachment, a wet grinding attachment, and a vertical position indicator attachment.

It is furnished with an anti-friction spindle, powered by a 5-hp direct-drive motor. The spindle is flange mounted.

The spindle upright moves on its own vee- and flat-way transversely, while the table is also mounted on a separate vee- and flat-way for longitudinal movement.

A low-pressure hydraulic system is easily accessible and requires little maintenance.

Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

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### Pyramid Angle Roll


The Hill Acme Co. has redesigned the Kling pyramid angle roll which

rolls angles, channels, and flat bars. Principal features are welded steel construction with a totally enclosed worm gear drive, plus a power elevated screw



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Inglewood, Calif.

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MACHINE and TOOL BLUE BOOK

running on anti-friction bearings. It is self-contained.

Shown is model 1/2A which has a rolling speed of 30 fpm. It weighs 9000 lbs. and has a capacity of  $3\frac{1}{2}$ " x  $3\frac{1}{2}$ " x  $\frac{3}{8}$ " in angles and 6" x 1" in flat bars. A 10 hp variable-speed wound-rotor motor is standard equipment.

The Hill Acme Co., 1201 Breakwater Ave., Cleveland 2, Ohio.

Use postpaid card. Circle No. 195

### Cutoff Saw and Grinder

A multi-purpose cutoff saw and pedestal grinder that makes accurate cuts in all types of steel without clamping or coolant has been developed by Production Machinery, Inc. Straight cuts, mitres, notches, and incisions can be made by either free-hand or table cutting.

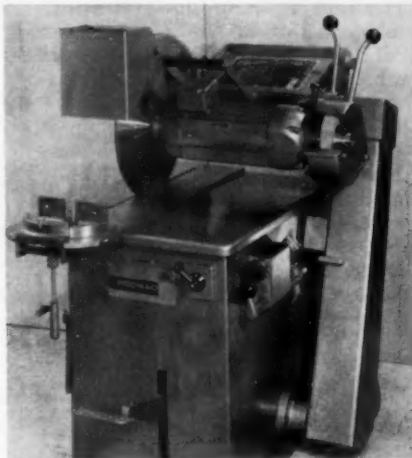
This model 14SA produces a milling-like action rather than biting and chipping in the conventional cutoff manner.

Through cuts on 2" x 2" x  $\frac{1}{8}$ " angles are made in 1 sec. Up to 2500 such cuts

are claimed before resharpener. A 15" plate is cleared by head and column on a through-cut.

Production Machinery, Inc., 4941 W. Belmont Ave., Chicago 41, Ill.

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$1\frac{1}{2}$	54.00	15.00
2	75.00	20.00
$2\frac{1}{2}$	102.00	26.00
3	130.00	32.00

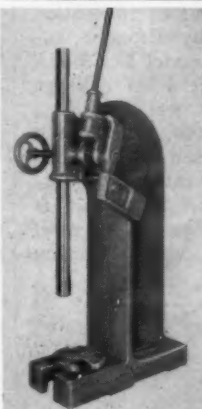
These diamonds can be set in any shank to your specifications for \$1.00 each extra.

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MODEL  
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14" Diameter  
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Model No. 3E (simple lever) and 3ER (ratchet type) for bench mounting or may be furnished with stand.

Write for Catalog B-44 or see your local dealer for specifications.

Greenard ARBOR PRESS CO

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### Press-Type Broaching Machine

A press-type broaching machine for automatic, heavy-duty applications has been introduced by General Broach & Engr. Co. Offered in six standard models, it has a normal operating capacity ranging from 4 to 15 tons with a stroke span of 22" to 36". A stroke control limit switch permits accurate adjustment to meet individual requirements.

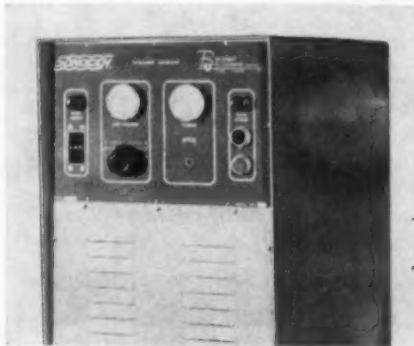
Features include a hydraulic pump, a 100 to 140 gal. capacity tank, and a heavy-duty motor, all externally mounted as a separate unit. All models are equipped with a four-way guided ram.

General Broach & Engr. Co., 14333 Prairie Ave., Detroit 38, Mich.

Use postpaid card. Circle No. 193

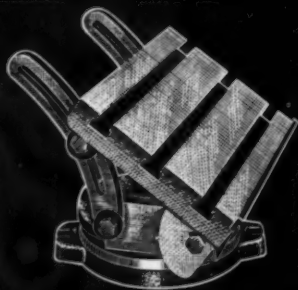
### Ultrasonic Generator Features Automatic Load Compensation

A single-unit ultrasonic generator featuring automatic load compensation has been announced by Branson Instruments. Called the model LG-3500A Sonogen, this unit offers an average power output of 3500 watts, with a peak on pulses of 7000. Because it automatically adjusts itself to variations in cleaning load, temperature of solution, and tank volume, this unit is ideal for high-speed cleaning of steel strip, multiple-strand wire cleaning



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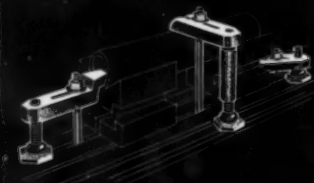
## 5 WAYS.....



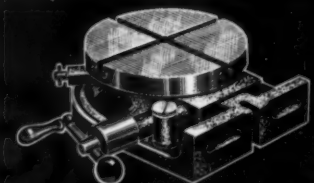
ADJUSTABLE ANGLE PLATES



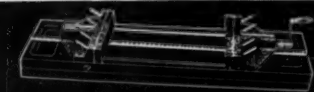
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Peekskill PE 7-2838  
Electra Industrial Dist. Inc.,  
Poughkeepsie GL 2-9000

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Erie GL 2-1401  
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Pittsburgh HU 1-4400

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Seattle MA 4-1777

## WISCONSIN

Herlache Industrial Supply Co.,  
Green Bay HE 2-8669  
Triplex Supply Co.,  
Milwaukee BR 1-7566

## CANADA

Alexander Tools Ltd.,  
Brantford, Ontario PL 3-3181

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# UNIVERSAL

## WISE & TOOL CO.

PARMA • MICHIGAN

machines, long conveyORIZED systems, and large-volume or heavy-duty batch operations.

Normally using bulkhead or immersible transducers, this unit can be supplied with side-mounted, bottom-mounted, or opposed transducers.

Branson Instruments, Inc., 40 Brown House Road, Stamford, Conn.

Use postpaid card. Circle No. 88

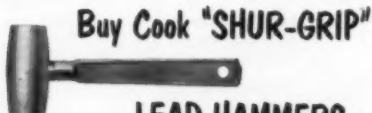
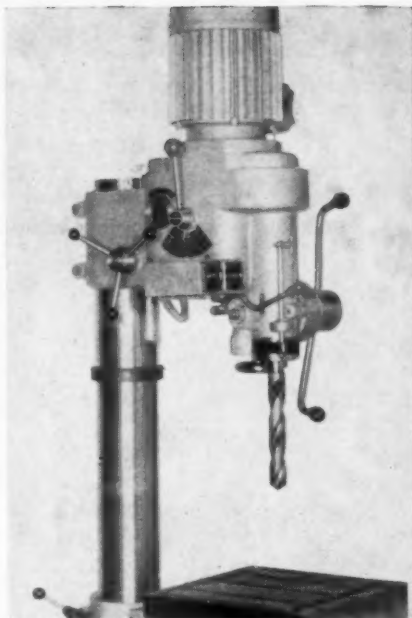
### Geared Head Drill Press

Boice-Crane Co. has announced a Swedish built geared-head drill press with capacity to  $1\frac{3}{4}$ " hole in cast iron and  $1\frac{1}{2}$ " in steel. Features include a two-speed  $2\frac{1}{2}$  hp. motor,  $5\frac{1}{2}$ " diameter column; 6" maximum spindle travel; three feed rates, and the oil pump and gears running in oil.

In addition to the combination hand and power feed model stocked, a solely hand feed model is available on special order.

Boice-Crane Co., 931 Central Ave., Toledo 6, Ohio.

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Buy Cook "SHUR-GRIP"

### LEAD HAMMERS—

They're a MUST in every shop where many blows have to be struck without marring surfaces. Available with "SHUR-GRIP" drop-forged handles.

Write for circular and prices

COOK LEAD HAMMER SERVICE

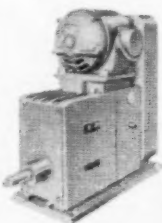
67 MASSACHUSETTS AVENUE, EAST PROVIDENCE 14, R. I.

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### DRILL FEED UNITS

for drilling, tapping, milling, boring. Cam, hydraulic, or lead screw. Many sizes,  $\frac{1}{2}$  to 15 hp. Avey Division, Motch & Merryweather Cincinnati 1, Ohio



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### SPELLMACO "SPOTTERS"

A matched set of transfer punches for toolmakers, machinists & tool cribs

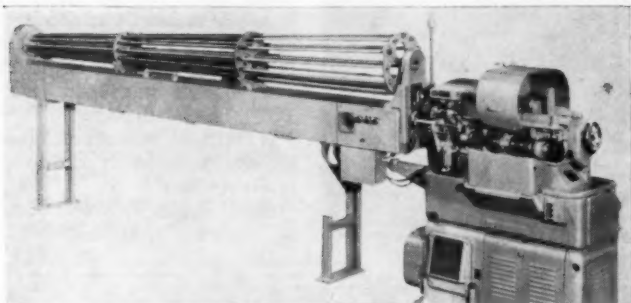
Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for long life—0.025 undersize to facilitate use—Black oxide finish  
Set No. 3-17, 28 punches with indexed stand—size  $\frac{3}{32}$ " to  $\frac{1}{2}$ " by  $\frac{1}{64}$ "—plus handy  $\frac{17}{32}$ " size. Length 4-7/8" ONLY \$19.40

Single sizes available

**R. L. SPELLMAN CO. - URBANA, OHIO**

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### Automatic Bar Stock Feeder

Unit Machinery Co. has designed a bar hopper for use with single-spindle screw machines, centerless grinders, thread rollers, and other equipment working from long bar stock.

This bar hopper attaches to the bar feed end of a machine. It consists of a magazine of twelve telescoping tubes, slightly tapered in arrangement, and carried in rotatable mountings at both ends. As a bar runs out in the machine, a new bar is automatically inserted

from the magazine. This operation takes less than 1 second.

The magazine is loaded by inserting bars into the exposed tubes in the upper part of the magazine. This is done by feeding them in over the machine from the working aisle.

Each feed tube has a telescoping rear section which is automatically drawn up to compensate for variations in bar length of as much as 9".

Unit Machinery Co., Rockford, Ill.

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## the **ARC-TWIN** *Cuts Two Perfect Notches* in *One Downstroke of Press!*

**SAVING** both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2½" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.



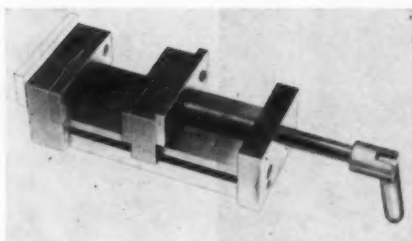
Ask for  
twin-notched  
sample of  
pipe  
or tubing

# VOGEL

## TOOL AND DIE CORPORATION

1827 North 32nd Ave.  
Stone Park, Illinois

Use postpaid card. Circle No. 297



Use postpaid card. Circle No. 90

### Vise With Large Jaw Opening

A toolmakers' vise featuring a 6" jaw opening and a 3" jaw width has been introduced by Bald Eagle Products Co. The vise is hardened and ground to .0002" in parallelism.

It utilizes removable hardened and ground jaws with inside and outside jaw positions.

Bald Eagle Products Co., 60 E. 4th St., St. Paul 1, Minn.

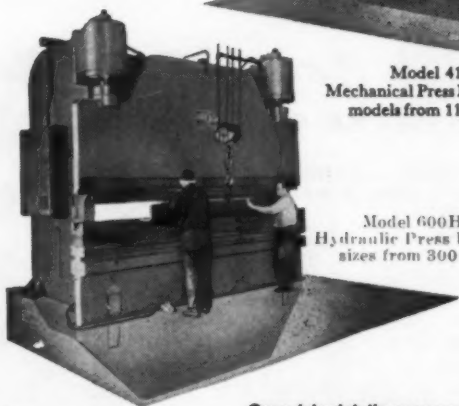
## CHICAGO® PRESS BRAKES

UNEXCELLED ACCURACY

for sheet metal  
and plate work



Model 410D, 90-Ton CHICAGO Mechanical Press Brake. Other standard models from 11 to 450 ton capacities.



Model 600H10, 600-Ton CHICAGO Hydraulic Press Brake. Other standard sizes from 300 to 2000 ton capacities

8466

Complete details or recommendations  
on any press brake work upon request

Press Brakes  
Press Brake Dies  
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Hand and Power Bending Brakes  
Special Forming Machines



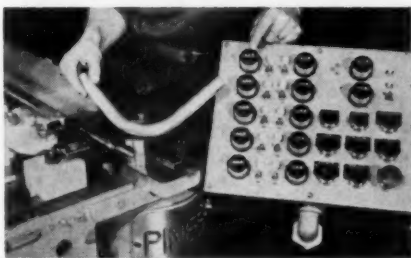
**DREIS & KRUMP**  
MANUFACTURING CO.

7440 S. Loomis Blvd., Chicago 36, Illinois

Use postpaid card. Circle No. 295

## Electronic Bend Angle Selector Programs Bending Operations

An electronic angle-of-bend selector announced by Pines Engr. Co., programs bending operations and reduces their setup time. Each bend angle is dialed in a normal progressive sequence on the individual angle dials on the panel. Up to ten different angles can be programmed on the rotary model,

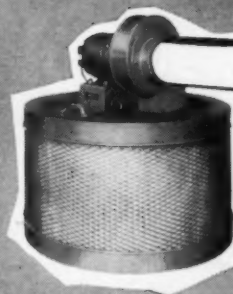


# MISTKOP

STOPS  
MIST



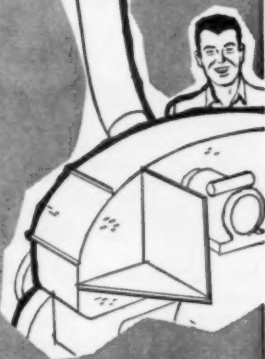
COLLECTS MIST-FOG EFFECTIVELY  
IN A SMALLER SPACE



NON-  
ELECTRONIC

This efficient Mistkop unit provides low-cost mist control for all machining operations employing coolants or lubricants. Requires no duct work or costly piping—*is actually portable!*

Mistkop is sturdy in design—has a minimum number of parts and gives long, trouble-free service. Stops clouding of lights... eliminates fire hazards of uncontrolled mist. Write for detailed description.



### AGET

Manufacturing Company  
1402 Church Street • Adrian, Michigan

Use postpaid card. Circle No. 298

and up to fifteen on the press model. Dial-A-Bend units are now available on most new or in-service machines and presses.

It operates on the principle of matching electrical impulses from signal potentiometers which are set to produce the required degree of bend. When the swinging arm rotates to the proper angle, the control matches the angle dial setting and the bending arm is stopped, terminating the bend. Each

angle dial is equipped with a three-digit micro-dial graduated in tenths of a degree to provide maximum precision in bend angle settings.

Pines Engr. Co., Inc., 601 Walnut St., Aurora, Ill.

Use postpaid card. Circle No. 91

### **Automatic Flying Shear Cuts 6" Tubing**

Automatic cutoff of tubing up to 6" O.D. with wall thickness ranging from



No—some holders just "wobble." But Scully-Jones floating holders provide unrestricted float for improved drilling, reaming, and tapping. A constant velocity, flexible drive coupling eliminates "dead" spots and binding. Three styles (left to right): "JS" for turret lathes and automatics; "JA" for standard radial drills and drill presses; lock-and-eject type "JT" for multiple-spindle machines. For complete description and specifications ask for Bulletin No. 8-50.



**Scully-Jones and Company**

1907 South Rockwell Street, Chicago 8, Illinois

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.050" to .250" is performed with this flying shear cutoff machine designed and built by Alpha Press & Machine, Inc. This 200-ton capacity machine works in direct conjunction with the mill, automatically producing cut lengths of boiler or structural tubing. The machine cuts any shape tubing that can be produced by the mill at a maxi-

mum rate of 300 fpm. It is capable of 20 cuts per minute.

The Alpha is a two-point, four-post press with crankshaft parallel to the die travel. It is equipped with a die acceleration unit for starting and returning the die.

Alpha Press & Machine, Inc., 9281 Freeland Ave., Detroit 28, Mich.

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## KEYSEATS OIL GROOVES

QUICKLY ÷ INEXPENSIVELY

**NATIONAL** KEYSEATING OR OIL GROOVING MILLERS—when chucked in a drill press or radial, mills accurate keyways, oil grooves or slots in one pass of the miller through the bore of work piece.

**NATIONAL** millers are also designed for milling in BLIND holes. They can be indexed for milling opposite or multiple splines.

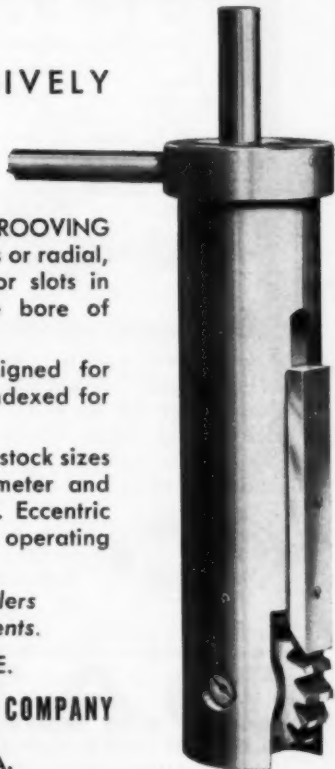
**NATIONAL** millers are available in stock sizes for bores from  $\frac{1}{2}$ " to  $3\frac{1}{2}$ " in diameter and with cutter widths from  $\frac{3}{32}$ " to 1". Eccentric bushings are available to increase the operating range of each miller.

*Keyseating or Oilgrooving Millers  
built to your special requirements.*

WRITE FOR FREE BROCHURE.

**NATIONAL MACHINE TOOL COMPANY**

P.O. Box 92, Station 'B'.  
CINCINNATI 22, OHIO, U.S.A.



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### Versatile Adjustable Gantry

A 4-ton capacity gantry that folds compactly for storage is now offered by B. E. Wallace Products Corp. Called a Magic-Pole universal gantry, it is easily transported to widely separated job sights. It can be quickly dismantled simply by removing its caster frames, closing the telescoping legs, and folding them against the I-beam.

This gantry can be lowered and nar-

rowed for rolling under fire doors, into elevators, and through tight aisles. A self-leveling I-beam is also provided for off-center loads. The trolley is free to travel the full beam length.

Other features include removable swivel lock casters and caster frames, and springloaded bolts that free both hands for making adjustments.

B. E. Wallace Products Corp., Exton, Pennsylvania.

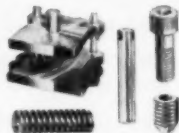
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You name it and if a diemaker needs it, Danly's got it. Whether it's a dowel pin, socket screw, die spring, strip-per bolt or die set component, it's stocked for immediate delivery at your nearby Danly branch or distributor. Quality is tops, of course. Service, too — fast, efficient and as close as your phone. Try it.



Write for literature on the complete Danly line of Diemakers' Supplies



PRECISION PRESSES, DIE SETS AND DIEMAKERS' SUPPLIES  
HYDRAULIC METALWORKING EQUIPMENT

# DANLY

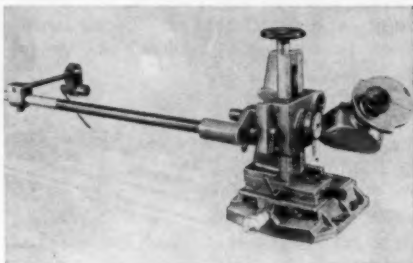
DANLY MACHINE SPECIALTIES, INC.  
2100 South Laramie Ave., Chicago 50, Illinois

Use postpaid card. Circle No. 301

MACHINE and TOOL BLUE BOOK

### Optical Instrument Aids Visual Grinding Control

An instrument that provides visual control for precise grinding on surface and cylindrical grinders is announced by Parker-Hartford Corp. Called a "Profiloscope," it provides continuous optical inspection through all stages of form grinding. It is an independent optical unit that can be attached to



# TORIT DUST COLLECTORS

keep plants clean

lessen employee grievances

save valuable dusts

Torit Dust Collectors keep plants clean . . . an important factor in protecting employee health and morale—and in lowering absenteeism and employee grievances. Economical, too, these units are portable. They cost a fraction of central built-ins and are not limited to certain areas. They save heat by recirculating clean, filtered air. And, as in tungsten carbide manufacturing or diamond grinding operations, they pay for themselves in days with the valuable dusts they recover.



**Torit Cabinet Cloth-Filter Model.** High efficiency collection of all types of dust. Particles are trapped on fine-woven cloth filters—99%+ efficiency (by weight). Clean filtered air is drawn past the motor and blower to keep it cool.

Self contained, portable steel cabinets. Removable doors allow ready access to filters, motors, and blowers. Filters are chemically treated for spark resistance and sealed against leakage. These compact units give maximum filter area in smallest possible space. Capacities range up to 2100 cubic feet per minute. Larger units are built on special order. Prices start at \$230.

*\*For a FREE handbook detailing specifications and performance data of Torit Dust Collectors and applications, write Dept. 629*

**TORIT MANUFACTURING CO.**

1133 Rankin Street • St. Paul 16, Minnesota

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standard grinders already in use. Width, depth, and coordinate checks are facilitated to readings of .0002" on special form tools.

The Profiloscope consists of a microscopic eyepiece through which are seen the wheel and workpiece, magnified 25, 50, or 100 times, and superimposed over the desired form on a reticle.

Six standard reticles are contained in a rotating turret head on the instrument.

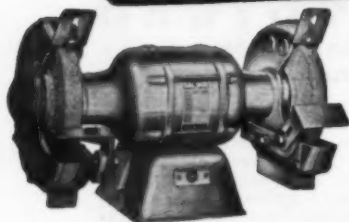
Optical Division, Parker-Hartford Corp., 650 Franklin Ave., Hartford, Connecticut.

Use postpaid card. Circle No. 94

#### Automatic Lift Table

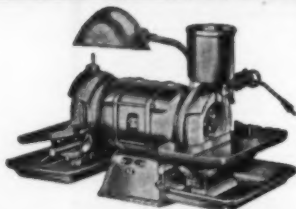
A lift table that raises and moves forward or backward at the operator's command has been introduced by Lange Lift Co. This table, which can be mounted on a track or can be run on the floor, keeps level at all times.

## MOST *Value-Packed* GRINDER MADE!



**only \$112<sup>00</sup>**

#### CARBIDE TOOL GRINDER



Model 153-6". Reversible 1/2 HP motor, 3450 RPM. 1 1/2" wide wheels. Every part oversize for rugged, long-lasting use. Just

# BALDOR

#### MODEL 153-8"

Feature for feature, no other grinder offers so much for so little. Compare HP rating, wheel size, shaft diameter, bearing size with any other similar-type grinder. You'll quickly see why you get *more* with Baldor!

- Big 1/2 HP motor; won't burnout even if repeatedly overloaded!
- Wide-clearance design provides maximum working room!
- Large 8" first grade wheels!
- Heavier 3/4" arbor; larger ball-bearings!
- Dynamically-balanced rotor—extra smooth operation!
- Exhaust-type guards!

Write today for Bulletin 321N on complete line of Baldor Grinders and Buffers!

### BALDOR ELECTRIC CO.

4353 DUNCAN AVE.

ST. LOUIS 10, MO.

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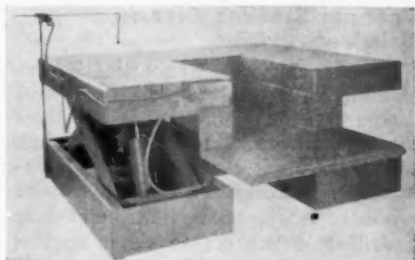
When sheets are piled on it, the table raises automatically as each sheet is removed.

One motor is used for its entire operation.

The deck is 84" x 96" and capacity is 15 tons.

Lange Lift Co., 4225 N. 124th St., Milwaukee 22, Wis.

Use postpaid card. Circle No. 95



## BORE SMALL HOLES FASTER with **WE-BOR** Tools

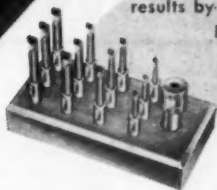
We-Bor Boring Tool Holders offer adjustability without excessive off-center mass and vibration at hi-rpm's needed for most efficient carbide boring of small holes—up to 1" diameter. Simple two-piece construction calibrated for easy, accurate adjustment.



**Wetmore Carbide Boring Tools**—for production boring of small holes to highest precision and finish. 24 standard sizes offered for bores from  $\frac{1}{16}$  to 1" diameter. For best results use We-Bor Adjustable Holders.



**We-Bor Boring Tool Complete Set**  
Greatly simplify boring small holes and give rewarding results by producing more holes per hour with superior finish and accuracy.



Write for **NEW 32-Page Catalog**—Dealers in principal centers.



**Wetmore Tool and Engineering Co.**

5320 E. Washington Blvd., Los Angeles 22, California



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### **Vacuum Sleeves Clean Fabricating Dies**

Air-Vac Engr. Co. announces its line of bazooka sleeves which provide a vacuum source for removing loose shavings, piercings, notchings, or slugs from fabricating dies. This sleeve is designed to be installed into the die under a punch. A compressed air inlet hole is drilled in the die so air is applied to the ports between the O-ring seals.

This air then exhausts out the bottom of the sleeve, creating a vacuum in the die openings.

To minimize air consumption, a pressure regulator or shut-off valve can be installed.

Vacuum sleeves are available with "A" diameters of .109" to .750", and from .937" to 1.250" on special order.

**Air-Vac Engr. Co., Inc.**, 33 Old Stratford Road, Shelton, Conn.

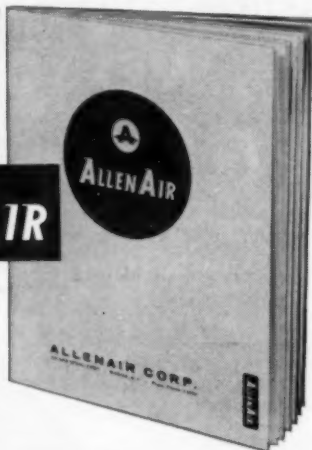
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### **"GOLD MINE" OF VITAL INFORMATION**

# **NEW**



# **DATA BOOK**



4-Way Pilot-Timer Valve • PTV-4



Automatic Return Cylinder • VER-R



Dial Feed Table • 725-E

**FREE—Write for Your Copy Before Next Tuesday!**

# **ALLEN AIR** CORPORATION

269 EAST 2nd STREET, MINEOLA, NEW YORK

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### Modular Spring Looper

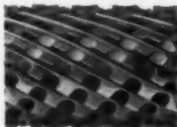
A modular spring looper has been designed by The Torrington Mfg. Co. as a semiautomatic or automatic high-speed machine for either independent operations or in combination with any standard spring coiling machine. The looping tools and tool-adaptor assemblies are said to reduce setup time and maintenance downtime.

This looper can form all standard types of loops on springs with an unusually wide diameter range from  $\frac{1}{8}$ " to  $\frac{3}{4}$ " and body lengths from  $\frac{5}{16}$ " to 5". Wire capacity ranges from a maximum of .072" down to approximately .010".

The Torrington Mfg. Co., Torrington, Conn.

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## DIXIE CARBIDE ROUT-O-MILLS



EFFICIENTLY ROUT, MILL AND TRIM THE  
HARDEST, MOST ABRASIVE **PLASTICS**



Custom designed Dixie Carbide Rout-O-Mills rout, mill and trim "hi-hard" plastics such as reinforced fibre-glass, melamine, Plexiglas, Epoxys and laminated plastics. Exclusive tooth designs provide much faster cutting speeds and considerably longer tool life.

Carbide Rout-O-Mills are available in  $\frac{1}{16}$  to  $1\frac{1}{2}$  inch diameters . . . and tooth designs in many contours are available. Send for Rout-O-Mill Bulletin.

Contact Dixie Tool Industries for machining and engineering assistance in plastics fabrication.

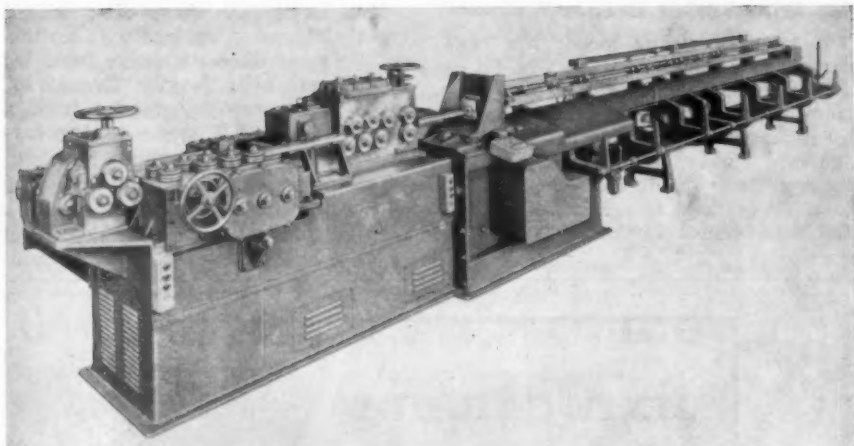
Complete Carbide Tool catalog available upon request.

**Dixie Tool Industries, Inc.**  
Bridgeport 2, Michigan.



100

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### **Straightening, Cutting Machine**

The Lewis Machine Co. has introduced a wire straightening and cutting machine with a capacity of 5/16" to 13/16" square or hex mild steel in shapes and flats up to 2" wide.

This model 21FHA features a low-inertia flying-shear cutoff and an electric trip mechanism that is independent of the gaging mechanism.

This machine is designed to take the stock from the coil, straighten it, and

## **RB INTERNAL CUTTING TOOLS**

**4 DISTINCTIVE STYLES  
IN CARBIDE & HSS**

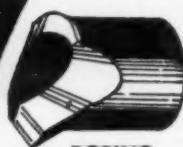
SIZES FROM 1/8" UPWARD

*Write for free complete catalog*

**R. B. TOOL CO. INC.**

340 Maple Ave., Westbury, L. I., N. Y.

EDgewood 3-1382



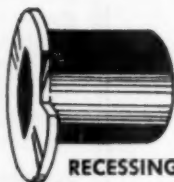
**BORING**



**FACING**



**THREADING**



**RECESSING**



**SOLID SHANK TYPE**



**DETACHABLE HEAD TYPE**

cut it automatically to accurate predetermined lengths.

A two-speed sliding gear-feed transmission has positive feed speeds of 150 and 195 fpm. The cut-off is a high-speed flying shear which travels with the rod and cuts while in motion. A single crank-driven lever provides both the longitudinal travel and the vertical cutting stroke, and eliminates all cams, springs, and loose links.

The electric trip is designed to assure positive tripping of the clutch at high speed. The wire or rod traveling through the split guide bar engages the limit switch finger and by direct electrical connection energizes the clutch and brake solenoid valves.

The Lewis Machine Co., 3441 E. 76th St., Cleveland 27, Ohio.

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### Industrial Pallet Box

A welded-steel pallet box designed for stacking has been developed by

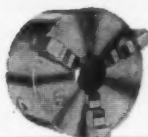


One of England's Finest

## LATHE CHUCKS

with average guaranteed accuracy of .002" three inches from the jaw face

AND OTHER GREAT FEATURES INCLUDING: ONE PIECE BODY • FLAME HARDENED JAW WAYS • INDUCTION HARDENED SCROLL FORM • SUPPLIED COMPLETE WITH TWO SETS OF JAWS AND CHUCK WRENCH • CERTIFICATE SUPPLIED WITH EVERY CHUCK ATTESTING TO AND GUARANTEEING ACCURACY



3-JAW GEARED SCROLL



4-JAW INDEPENDENT

Size	Weight (lbs.)	Dia. of Bore	Price*
3-1/2"	6	5/8"	\$37.50
4-1/2"	6	1-1/8"	37.50
5-1/2"	11	1-1/2"	47.50
6-1/2"	16	1-11/16"	54.50
7-1/2"	26	2-1/4"	66.50
9"	38	2-3/4"	81.50
10-1/2"	68	3-1/2"	99.00
12"	106	3-7/8"	130.00

\* All prices f.o.b. warehouse, N.Y.C.

Back Plates available at extra cost

Size	Weight (lbs.)	Dia. of Bore	Price*
4"	4	1"	\$37.00
6"	9	1-3/4"	31.50
4-1/2"	8	1-9/32"	27.00
6"	17	1-3/4"	33.50
8"	34	2-3/16"	56.50
10"	50	2-3/16"	74.50
12"	68	3-3/8"	88.00
14"	88	3-3/8"	101.00
16"	116	3-15/16"	119.00

In Stock: Direct mounting for American long taper spindle nose

Direct mounting camlock fitting.

Spare parts for chucks also available

ALL IN STOCK FOR IMMEDIATE DELIVERY

Write for complete new lathe chuck catalog

MANHATTAN SUPPLY CO., 151-A GRAND STREET, NEW YORK 13, NEW YORK • CANAL 6-4992

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Hugh J. Baker & Co. Units illustrated are 30" high, 36" wide, and 48" long. Skid-type legs add 4" to the height.

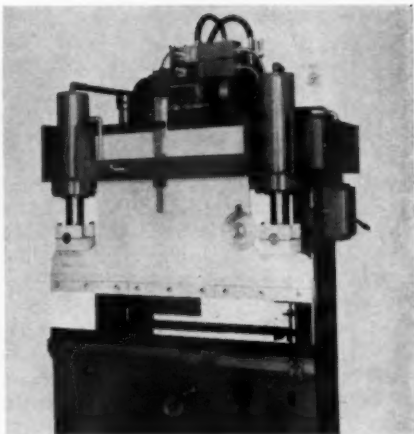
One end of the boxes have expanded metal sides for immediate identification of contents. Opposite ends are equipped with sliding gates for feeding directly to hoppers or machine feed mechanisms. Legs are designed to nest on top support of underneath unit when stacking.

Hugh J. Baker & Co., 602 W. McCarty St., P.O. Box 892, Indianapolis 6, Ind.

Use postpaid card. Circle No. 100

### Electronic Hydraulic Cylinders Actuates Press Brake

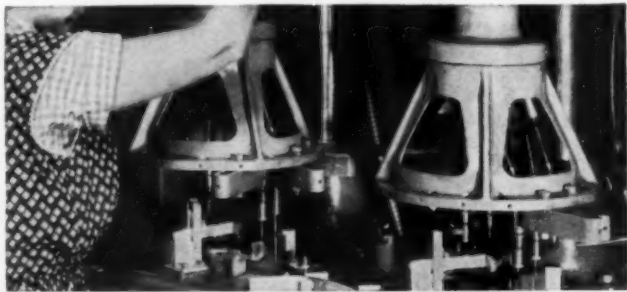
A 30-ton press brake, actuated by a pair of electronically controlled hydraulic cylinders, has been introduced by Pedersen Electronics. It is claimed to be so sensitive that the operator can stop the ram within .0005". A 10" available stroke can be set to match each job and it can be reduced in length to less than 1". Full tonnage is



available through the entire length of stroke and the ram can be bottomed without jamming.

The point-of-speed change of the two-speed brake can be adjusted for each job to take advantage of the fast

**Makes  
any  
drill press  
a HIGH**



## PRODUCTION TOOL in minutes!

With a MULTI-DRILL, you can go from hole-at-a-time drilling to real production in a matter of minutes! That's all the time it takes to mount any one of the many standard MULTI-DRILL adjustable multiple spindle drill press attachments on any drill press and put you into time and money-saving multiple drilling. Every MULTI-DRILL is quickly adjustable to drill a variety of hole patterns. Every MULTI-DRILL is designed for high production work. To learn how you can profit with a MULTI-DRILL, ask your nearby Commander Distributor to show and demonstrate the unit that meets your job requirements.

109



**Commander MFG. CO.**

4227 WEST KINZIE

CHICAGO 24, ILLINOIS

Write for the  
Production Tool Catalog

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advance and return. This press does not have to complete a fixed cycle every time it starts downward. The ram can be inched up or down and stopped at any point, thus reducing the number of rejects due to improperly positioning of parts.

Pedersen Electronics, 3730 Mt. Diablo Blvd., Lafayette, Calif.

Use postpaid card. Circle No. 101

### Industrial Tool Carrier

This heavy-duty tool carrier has been designed for storage of the cumbersome tools and equipment necessary to set up and maintain modern production machinery. Each of the four drawers is 15" x 23½" x 4¾" and can be padlocked individually. The entire cabinet can be moved on its 2½" diameter caster wheels. Cabinet is 18" x 24" x 34" high and finished in forest green baked enamel. Other one, two, and three-drawer models are available.

Bay Products, 1801 W. Cambria St., Philadelphia 32, Pa.



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## FREE DATA ON GEARS

This new 16-page brochure presents the essential facts and performance figures on several types of Meehanite metal.

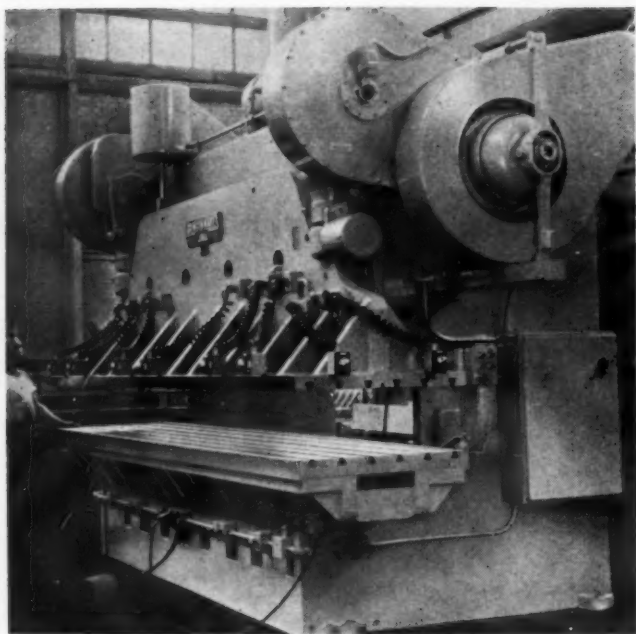
For your free copy of this informative brochure, write to the Meehanite Metal Corp., New Rochelle, N. Y. Ask for B-53. Meehanite Gears serve industry . . . better



## MEEHANITE METAL

*Meehanite Castings Are Made Only By Meehanite Foundries*

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### **Brake for Press Operations**

The utilization of added die lengths and widths available in press brake design is typified by this 9 series x 10' mechanical press brake, manufactured by The Cincinnati Shaper Co., for press applications. The machine develops 225 tons at or near the bottom of the stroke.

The 36" permanently widened bed and ram provide adequate back-up for large die sets. The double plate bed is equipped with a shelf for the adapta-

tion of die cushions for press applications requiring such units.

Added features include: remote control to the power ram elevation; a 5" stroke; air counterbalances; tonnage load indicator; electromagnetic brake on the ram adjusting motor; automatic ram stop at the top of the stroke with nonrepeat feature; and reversing control.

The Cincinnati Shaper Co., P.O. Box 111, Cincinnati 11, Ohio.

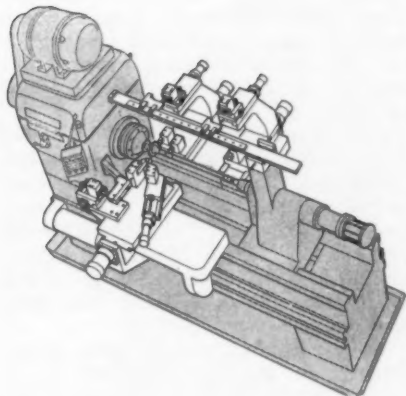
Use postpaid card. Circle No. 103

### **Tracer Control Converter For Standard Lathes**

A tracer control conversion unit is being introduced by Detroit Broach & Machine Co. which converts almost any standard lathe into a production tracer lathe.

The unit can be used on either horizontal or vertical machines. It is designed to control both carriage and

cross-slide of the machine from a single tracer valve. This feature, plus the fact that the cross-slide is always at full 90° to the machine's spindle axis, enables a converted machine to generate any contour—concave radii, re-entrant angles, square shoulders, chamfers, and acute angles, in addition to performing facing, and straight, inside, and outside diameter turning operations.



The tracer control unit is designed so it can be arranged for multi-pass cycling and automatic tool indexing. Provisions for hydraulic actuation of chucking, tailstock, clutch and brake, speeds, auxiliary plunge slide and automatic loading also can be provided.

Detroit Broach & Machine Co.,  
Rochester, Mich.

Use postpaid card. Circle No. 104

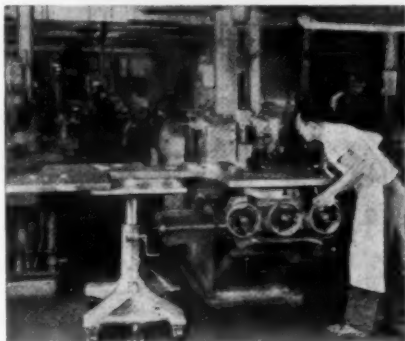
### Washing Unit for Shop Cleaning

A self-contained washing unit for industrial applications has been intro-



August, 1961

## THE BEST PORTABLE ELEVATING TABLE YOU CAN BUY . . . (Eliminates Cranking)



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- ✓ It's hydraulic . . . positions work or feeds at desired height without use of hands
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- ✓ Top turns 360° and clamps
- ✓ Foot release valve to lower
- ✓ Machined top surface can be used as work table
- ✓ Roller bearing casters with ball bearing swivels
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for as little as  
**\$22.00**  
 COMPLETE  
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Get This Production Boosting  
**"TRICO-MIST"**  
**COOLANT SYSTEM**  
*Increase Production And Tool  
 Life As Much As 500%*



For drilling, tapping, milling, sawing, grinding, etc. Removes heat from cutting edges of tools and work. Feeds can be increased considerably, finer finishes and accuracy are obtained. TRICO-MIST absorbs heat, thereby quenching it faster than flood coolants which only transfer it. Chips slide freely up the tool face and are blown away automatically. Simple needle valve controls size and volume of mist spray. Attaches to shop air line. Available with one and five gallon containers—single or multiple outlets—single or dual valve control.

SEND FOR BULLETIN 37

**TRICO FUSE MFG. CO.**  
 MILWAUKEE WIS. U.S.A.

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duced by Weaver Mfg. division of Dura Corp. It has been designed to give factories, machine shops, and foundries a unit capable of cleaning motors, machinery, parts, and assemblies, as well as floors and walls.

Built of noncorrosive brass and plated steel, with only one moving part, this "Wash-All" unit it claimed to be easy to operate and virtually maintenance free. Air-powered at recommended pressures of 150 to 175 psi, it can be mounted to any open top 55-gal. metal drum and is equipped with both wide and narrow spray nozzles.

Weaver Mfg. Division, Dura, Corp.,  
 2100 S. 9th St., Springfield, Ill.

Use postpaid card. Circle No. 105

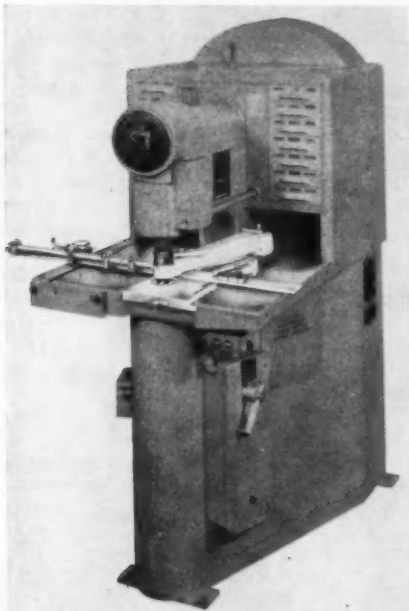
#### **Quick-Change Holder With Micro-Set Gaging**

Wales Strippit Inc. has announced the addition of a gaging system for all model 15A, 10AA, and 10A fabricators without any special adjustment or rework to the machines.

This gaging system consists of a 1¼" quick-change holder with micro-set gaging that allows the operator to make back and end settings directly to



"You'll make a good foreman, Burt—you've got the killer instinct."



thousandths in a matter of seconds. Dial indicator assemblies and micro-bars are mounted directly to the holder base and the back gage bar.

Wales Strippit Inc., 204 S. Buell Road, Akron, N.Y.

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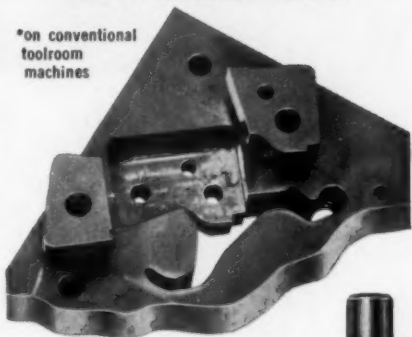
### Selective Flame Heating Machine

This flame heating machine, assembled from Cincinnati Milling Machine Co.'s "building block" units, is a self-contained machine with retractable, rotating work spindle, and standard flame heads. It has a conveyor-type quench tank.

This unit incorporates precise control of fuel gas, oxygen, air, water, and primary electric power. Accessory equipment includes an electronic temperature control, rotary flame head, a variety of work holding and automatic work handling fixtures. The quench tank includes automatic circulation and agitation of the quench medium, a

## FOR HARDENED STEEL MACHINING *look what can be done\* with* **MILL-ALL CARBIDE TOOLS**

\*on conventional  
toolroom  
machines



### TYPICAL USE (shown)

Product change made quickly, inexpensively on this hardened die (D2 steel—61 RC) by P.&F. Corbin Div'n., American Hardware Corp. with MILL-ALL Carbide Tools. Eliminates annealing deformation. No filing operation needed. Details on request.

### FEATURES

MILL-ALL research brings you: top grade carbide combined with advanced design. Permits easy sharpening, long life, accuracy. Complete line of standard sized drills, end mills, counterbores, boring bars, priced competitively.

RPM, size, style stamped into Shank.

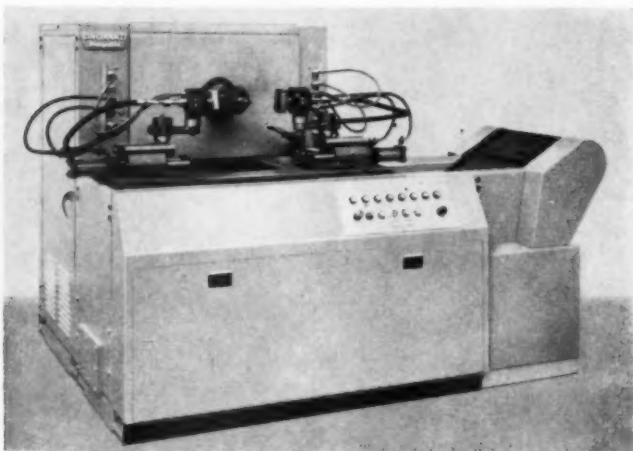
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## THE MILL-ALL CO.

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heat exchanger, and a motorized conveyor for the automatic removal of parts.

Cincinnati Milling Machine Co., Cincinnati, Ohio.

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**BIJUR ENGINEERED  
AUTOMATIC MIST CONTROL**



- **Coolant Mist Automatically Starts and Stops** with machinery, yielding maximum efficiency and economy of operation.
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- **Built to Last** — Constructed "to take it" —Choice of 18 ounce, 1 gallon or 5 gallon units.

4142

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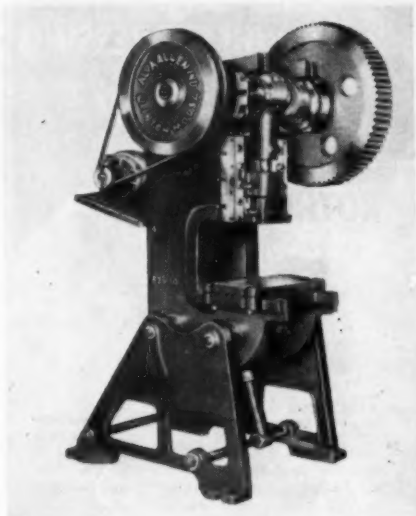
Use postpaid card. Circle No. 314

### Back-Geared Punch Presses

Alva Allen has designed a line of back-geared punch presses ranging in capacity from 2 tons through 25 tons. These presses give slow, powerful strokes and can be changed from repeat to non-repeat action. By using a back-geared press, spm or flywheel revolutions per minute can be reduced as desired without sacrificing loss of press tonnage capacity. Shown is the 25-ton model which has a 21" x 12" bed. The length of the stroke varies from 2½" to 4" at 100 spm.

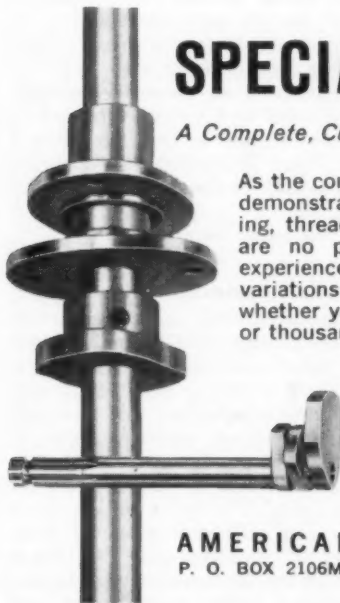
Alva Allen Industries, 1001-15 N. 3rd St., Clinton, Mo.

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### Pneumatic Attachment For Diamond Drag Marking Machine

H. P. Preis Engraving Machine Co. has announced a panto-engraver with a pneumatic attachment for diamond



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**INC.**

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# Angle Tangent to Radius WHEEL DRESSING *Simplified*

WITH  
**ROTHFUSS TOOLS**



## THE G-5 RADIUS DRESSER

is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on all wheels up to 10" and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius. The spring tension journal insures chatter free operation.  
**Price \$80.50**



**Price \$87.50**

## THE G-2 ANGLE DRESSER AND TOOL HOLDER

is actually two tools in one, having an easy to read vernier scale 0° to 180° giving accuracy within 2" of 1°; an excellent time saver to set up jobs to be milled, drilled, tapped on any desired angle.



All for only  
**\$149.50**

(including case  
and both tools  
with diamonds)

## FREE STORAGE CASE

of light-weight steel, with a hinged top, heavy duty latch and a blocked interior to insure the safety of the dressers when carried.

## OUR FIXTURES

will dress most radii and angles tangent each other, similar to those shown below.

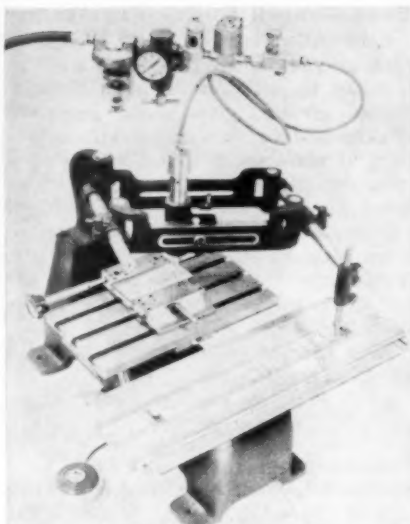
Distributorship available in select territories

**ROTHFUSS TOOL**  
COMPANY

BOX 2694 ELMWOOD STATION

PROVIDENCE 7, R. I.

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drag marking. This unit was designed for marking hardened steel, tungsten carbide, and all nonferrous metals. With the pneumatic attachment, depth or width of cut is controlled by the air pressure selected on the pressure dial which has a range from zero to 60 lbs. The air cylinder on the marking spindle is actuated by a micro switch which is suitable for foot or fingertip control.

H. P. Preis Engraving Machine Co.,  
242 Industrial Branch, U.S. Hwy 22,  
Hillside, N.J.

Use postpaid card. Circle No. 109

## Ten-Speed Speedmiller

Veet Industries has announced a ten-speed speedmiller used to improve the rate of metal removal in carbide milling. With 30 to 40 hp applied directly to the cutter spindle, this compact power unit removes metal at a rate of 2 to 3 cu. ipm per hp.

Ten speeds from 37 to 900 rpm are instantly available by a single lever shift. It can mill any material from cast iron to stainless steel. All gears are of high-tensile forgings with helical crown-shaped teeth, heat-treated, and

carried on anti-friction bearings. They are in constant mesh, and only clutches are shifted to change speeds.

Veet Industries, 25753 Groesbeck Hwy., E. Detroit, Mich.

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#### Induction Heating Machine

Cincinnati Milling Machine Co. has introduced a bench-type induction heating machine to be used for harden-



August, 1961

# 30 DAY FREE TRIAL



- BENCH
- PEDESTAL

## Queen City HEAVY DUTY

- GRINDERS • DISC GRINDERS and BUFFERS

We know what goes into these Grinders and Buffers! That's why we can make this offer.

Point for point — you just can't beat QUEEN CITY Heavy Duty Disc Grinders and Buffers. Built to stand up under hardest use . . . heavy duty motors deliver full horsepower. Wheels, guards, switches, cords, eyeshields are of highest quality . . . selected to deliver long, trouble-free service.

Choose from a complete line of floor or bench types . . . in sizes from  $\frac{1}{2}$  to 10 H.P. and buy them for 20 to 30% under competing makes. Try them for 30 days on money-back guarantee!

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MACHINE TOOL CO.**

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"Known for Quality for Over 50 Years"

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ing, annealing, drawing, normalizing, stress-relieving, soldering, brazing, shrink-fitting, bombarding, and similar industrial heat processing applications on either small-lot or high-production basis. It is self-contained, compact and can be placed directly in production lines to reduce work handling. Among the extras available are dual-heating stations and an independent electronic control to permit different heat levels to be employed at each station.

Cincinnati Milling Machine Co., Cincinnati, Ohio.

Use postpaid card. Circle No. 111

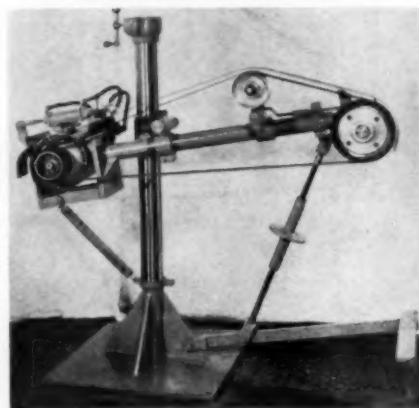
### **Abrasive Belt Grinder Features Foot Treadle**

Grinding & Polishing Machinery Corp. has introduced an abrasive belt grinder for spot grinding applications. Foot treadle operation permits the operator to use both hands to position the workpiece. The machine is mounted on a floor column and provides 12" of

vertical motion using the foot treadle. A 7½ hp totally enclosed, fan-cooled, ball-bearing motor drives a 3" wide x 132" long belt.

Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Indiana.

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## **KUTMORE ADJUSTABLE HOLLOW MILLS**



**A MIGHTY MIDGET!**

This Midget Floating Holder Hollow Mill, flange type, has metric adjustment, and is designed to permit easy compensation for any spindle misalignment. Small, sturdy, extremely accurate!

**Write for Catalog 20BB**

It shows complete line of adjustable hollow mills. Our Engineering Dept. is at your disposal for special requirements.

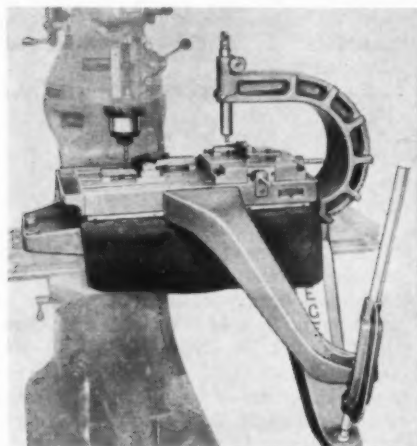
**CARL WIRTH & SON, INC.**

1625 CLINTON AVE. NO. ROCHESTER 5 NY

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## Two Lines of Duplicators Have Redesigned Raceways

Two lines of duplicator tables which feature redesigned ball-bearing race-



way are being marketed by J. M. Kalins & Co.

The R-200 line is a two-dimensional fluid-motion duplicator for contour profiling on any vertical miller. The R-300 is designed for fast, accurate two and three-dimensional duplicating and profiling of complex machined parts on Bridgeport millers only.

Completely self-contained, these duplicators have a single lever table control.

J. M. Kalins & Co., 1575 Railroad Ave., Bridgeport, Conn.

Use postpaid card. Circle No. 136

## 16-ton Expanded-Bed Press

High production of lightweight materials is one of the features of Havir Mfg. Co.'s 16-ton automatic press.

Speeds of 100 to 400 spm are standard with this expanded-bed Auto-Press, according to the company. The bed

**EISLER MAKES OVER 300 DIFFERENT TYPES OF INDEXING TURNTABLES WITH INDEXING DRIVES OF ALL KINDS. CAMS — GENEVA GEARS — SPEED REDUCERS AND VARIABLE SPEED CONTROLS. SPECIAL INDEXING TURNTABLES BUILT TO YOUR SPECS.**

EISLER INDEXING TURNTABLE THIS MODEL IS MADE FROM 4 TO 24 STATIONS GENEVA GEAR INDEX INSIDE THE HOUSING COMPLETELY ENCLOSED ARRANGEMENT MADE IN SEVERAL SIZES



NO. 88-S-30 6 POSITION INDEXING TURNTABLE GENEVA GEAR DRIVE SYNCHRONIZED WITH AIR OPERATED PRESS INDEXING TIME TO SUIT WORK



**EISLER ENGINEERING CO., INC.**

762 SOUTH 13th STREET

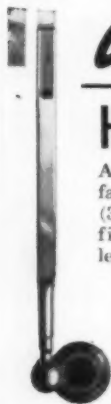
NEWARK 3, NEW JERSEY

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## balance ROTATING PARTS faster... easier...

Supersensitive Anderson Balancing Ways (Stand or Pillow Block Type) will static-balance rotating parts easier, faster, more accurately. No setup, no leveling, no centering. Glass-hard spindles and bearings prevent wear or ball-bearing indentations when balancing heavy work. Superior accuracy lasts throughout long life. Proved and preferred over 40 years.



## Anderson HAND SCRAPERS

Anderson Hand Scrapers are: (1) faster cutting, (2) easier to use, (3) just the right spring, (4) palm fitting grip, (5) 18" - 20" - 22" lengths. Saves costly regrinding.

**\$6.75** (18") with high speed blades

**\$9.85** (18") with carbide-tipped blades

**\$1.75** for rubber bumper shown below



Write for Bulletin 8-5

**ANDERSON BROS.  
MFG. CO.**

Rockford, Ill.

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measures 11½" x 15" with a feed of 8". The press has a cylindrical-type ram for precision alignment of die and ram with maximum ram rigidity. It stops automatically in the event of a die jam or misfeeding. This machine is available in single- or double-air clamped feeds.

Havir Mfg. Co., 44 N. Cleveland Ave., St. Paul, Minn.

Use postpaid card. Circle No. 114

## Portable Magnetic Device Detects Flaws in Metals

A portable magnetic device for detecting cracks and flaws in ferrous metals is being marketed by the Westinghouse X-ray department. Under an agreement between Westinghouse and the U. S. Casting Repair Co., developers of the device, this seal-lock magnetic crack detector supplements a number of radiographic and fluoroscopic systems marketed by the X-ray department for use in nondestructive testing.

This 14-lb. crack detector is essentially a U-shaped two-pole electromagnet which can be energized from a 6- or 12-volt automobile storage battery or from a 110-volt service outlet through a built-in rectifier.

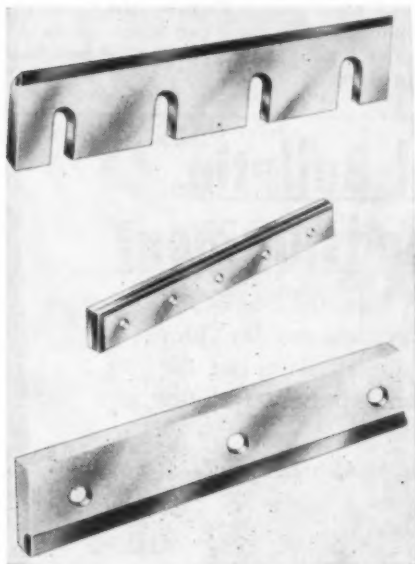
Components include a 14-lb magnetic probe unit, a 10' connector for attachment to the power supply, two types of



magnetic powder, sprinkling bulbs for applying the powder, and a steel carrying case. Total weight is 30 lbs.

X-Ray department, Westinghouse Electric Corp., P.O. Box 416, Baltimore 3, Maryland.

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#### **Carbide-Tipped Shearing Knives**

Tungsten carbide tipped knives, manufactured by Ohio Knife, can be used in high-speed cutting, shearing, and granulating. They are said to resist a high degree of abrasion and maintain cutting accuracy over long runs. They can be used on all classes of iron, steel, and nonferrous alloys.

Ohio Knife Co., Dreman Ave., Cincinnati, Ohio.

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#### **Threaded Expanding Mandrels**

Threaded expanding mandrels, designed to hold work on the pitch diameter of internal threads, are being made by LeCount Tool Works. These mandrels are available in unified coarse thread series from  $\frac{1}{4}$ "-20 to  $2\frac{1}{2}$ "-4 and in

*Highly polished flutes produce smoother, more accurate holes!*



*It pays to specify*

## **ACE**

### **DRILLS REAMERS BLANKS**

Premium Quality High  
Speed Steel, Carbide Tipped  
and Solid Carbide.

Call your local distributor today—or write Ace direct for latest catalog and price information.



**ACE DRILL**  
Adrian, Michigan

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

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unified fine thread series from  $\frac{1}{4}$ "-28 to  $1\frac{1}{2}$ "-12.

Mandrels with left-hand threads, and sizes larger than those indicated, are available.

They can be used for machining, grinding, balancing, and inspection where, the pitch diameter of an internal thread and the O.D. must be concentric, or where the shoulder of the workpiece must be square to the internal thread.

LeCount Tool Works, Inc., P.O. Box 252, Cheshire, Conn.

Use postpaid card. Circle No. 117

#### Corner Notching Unit

Corner notching units, made by Tool Products Corp., feature a cast-to-shape tool steel punch that is said to eliminate the need for a cap surrounding the punch and insures burr-free notching of parts.

## **Free Technical Bulletin** **on Surface Measurement**

gives all the meat of ASA Standard B46.1-1955 on surface roughness, waviness and lay, plus helpful supplementary material. Arranged for easy reading and convenient reference. Includes these sections:

- Basic definitions — with profile records of typical surfaces.
- How to designate the characteristics of roughness, waviness and lay, on drawings.
- How to measure those characteristics.
- Arithmetical and r.m.s. average roughness height.
- How the Profilometer® measures average roughness height.
- Instrument characteristics for roughness measurement — as specified by the standard, and as provided by the Profilometer.

It's timely — authoritative — comprehensive.

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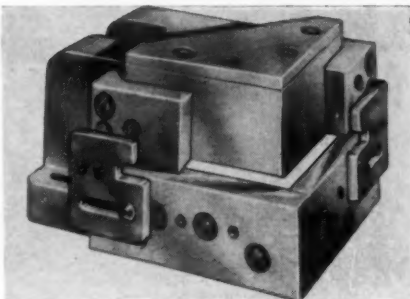
3621 S. STATE RD., ANN ARBOR 4, MICHIGAN

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This self-contained unit can be used for vee-notching or cropping of angles, as well as vee- and corner-notching of flat sheets. They are carried in both right- and left-handed models in the regular-duty series with 5½" shut height and 2-19/32" die height; or in the heavy-duty series with 8¾" shut height and 3½" die height.

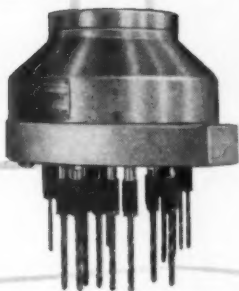
Tool Products Corp., North Tonawanda, N.Y.

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one head is better  
than more-if it's a

## **ZAGAR** Head for Drilling, Reaming and Tapping



*Zagar Standard Gearless  
Heads MAKE ANY NUMBER  
OF HOLES IN ANY PATTERN,  
IN ANY MATERIAL ON ALL  
CENTERS.*

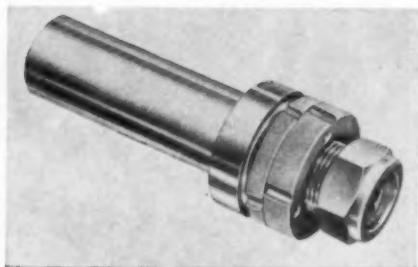
1 to 1000 holes in one pass—as close as twice drill diameter. Costs decrease as spindles are added. And, a variety of hole patterns (or parts) can be produced with one fixed center head. Zagar units are adaptable to standard drill presses or are built as a complete installation. Send in your hole problem to Zagar.

Write for Manual "B-8"  
for engineering data.

**Zagar** INCORPORATED  
USE MORE SPINDLES TO DO MORE WORK

23900 LAKELAND BLVD. • CLEVELAND 23, OHIO

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### Full-Floating Tool Holder

A collet-type, full-floating holder that compensates for both angular and parallel misalignment between tool and machine spindle has been developed by Erickson Tool Co. This holder employs the company's hardened steel collets. It uses a disc-spring arrangement to counterbalance the holder and tool. It can be used in the horizontal as well



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RPM EASY—  
IMMEDIATELY—  
ELECTRONICALLY!**

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Pioneer Photo**

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Press the button, aim the beam, read the speed . . . that's how easy and fast RPM measurement is with the new Pioneer Photo Tachometer. Ideal for use on lathes, drills, presses, drives and wheels. Operates electronically, with no wires or mechanical connections. Send for free bulletin.



**THE PIONEER ELECTRIC & RESEARCH CORP.**

Subsidiary of Penn Controls, Inc.

729 Circle Avenue

Forest Park, Illinois

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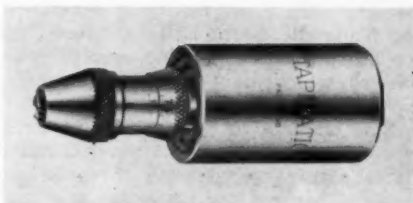
as the vertical position, revolving or stationary.

Collets have a collapsing range of 1/32" and are slotted at both ends.

Available in five models, this holder accepts collet sizes from 1/8" to 1 1/8" diameters. Any style shank can be provided.

Erickson Tool Co., 34350 Solon Road, Solon, Ohio.

Use postpaid card. Circle No. 119



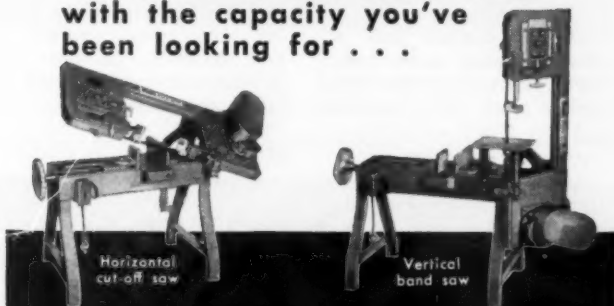
#### Drill Speeder

A gearless drill speeder which has a standard ratio of 7 to 1, although it

## The New WELLS MODEL 58-B

### A CONVERTIBLE BAND SAW

with the capacity you've been looking for . . .



### COMPACTLY BUILT • MODESTLY PRICED

Here's the all new Wells Model 58-B . . . a metal saw designed and built for double duty—double value. It's a compact, rugged, well guarded, extremely versatile unit . . . economically priced. As a horizontal cut-off saw, Model 58-B features quick-action vise (swivels to 45°); automatic shut-off; adjustable guides. Capacity: 6" x 10" rectangular shapes; 6" dia. rounds. For vertical use, swing head to upright position and install work table. Optional wheel-handle unit provides complete mobility. Write for complete information.



*The Pioneers of Horizontal*

**METAL CUTTING  
BAND SAWS**

**WELLS MANUFACTURING CORPORATION**  
707 Coolidge Ave., Three Rivers, Mich.

Use postpaid card. Circle No. 325

weighs only 9 oz., has been developed by Tapmatic Corp. Drilling speeds up to 22,500 rpm are possible even on machines which have maximum spindle speeds of only 1500 rpm.

The elimination of gears in the drill speeder assures vibrationless operation. It is manufactured with threaded or tapered mounts for universal application on all types of manual, semiautomatic and automatic drilling machines.

Tapmatic Corp., 845 W. 16th St., Costa Mesa, Calif.

Use postpaid card. Circle No. 120

### Sub-Miniature Solenoid Valves

Sub-miniature solenoid valves, manufactured by Skinner Precision Industries, Inc., are designed for use in hydraulic and pneumatic devices and control systems, and operate with all common media including many semi-corrosive fluids. Body and operating parts are stainless steel. They measure

1" in diameter x 2 1/4" high, and weigh 5 oz. Orifices are 3/64", and fluid connections are all 1/16" PTF. Because of this small size, fittings are provided to adapt them to standard 1/8" flared tube.

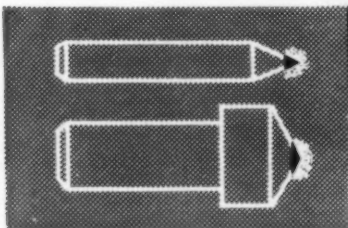
Operating differential pressures run from a vacuum of 5 microns to pressures of 150 psi.

Skinner Electric Valve Division, Skinner Precision Industries, Inc., New Britain, Conn.

Use postpaid card. Circle No. 121

### Welding, Trimming Machines Feature Improved Tooling

Swift Ohio Corp. has announced an improved tooling in production welding and flash trimming machines for welding and trimming automotive ring gears. The Model No. 25 flash welder (shown at right) is rated at 150 KVA and is fully automatic in operation. No. 0



**Victory Diamond  
Dresser Prices**

Carat	1/4	1/3	1/2	3/4	1	1 1/2	2	2 1/2	3
Price	\$2.75	3.50	5.00	7.30	10.00	14.80	18.50	23.00	27.50

Stock sizes: 7/16 x 6; 3/8 x 6; 7/16 x 2; 3/8 x 2.

No charge for other mountings.

**SPECIAL OFFER: Reject Thread Grinder Diamonds For Many Different Uses In Any Shop.**

1/4" x 1"; 1/4" x 1 1/2"; 3/8 x 1 3/4"; \$2.00 per tool.

Six tools minimum order.

**Send for new catalog folder**

Dept. M, P.O. Box 348, East Orange, N.J. — Tel. ORange 4-4874

**VICTORY  
DIAMOND  
TOOL**

**COMPANY, Inc.**

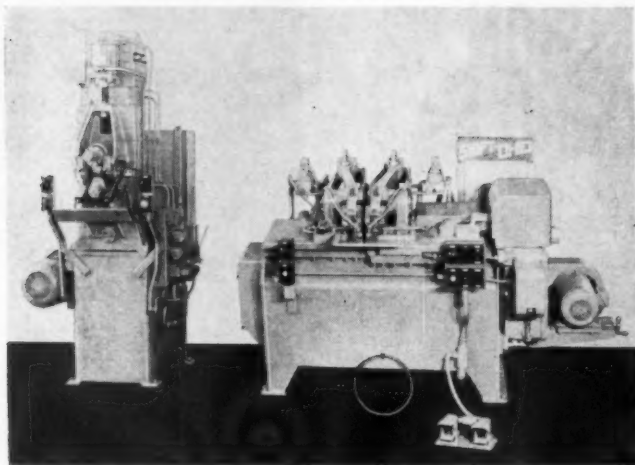
**Prompt resetting service. Export inquiries invited.**

Try to match **VICTORY'S** low diamond tool prices -- just try!

There is no mystery to Victory's ability to offer quality diamond dressing tools at prices lower than offered elsewhere. Long experience, up-to-date equipment and belief that big volume at small profit is better than small volume at large profit—these are the reasons.

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MACHINE and TOOL BLUE BOOK



oscillating flash trimmer (left) is hydraulically operated. It is also fully automatic.

The flash welder clamp fixtures are designed to align both ends of the ring

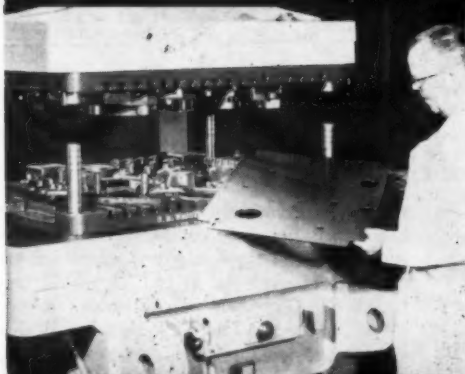
in a single motion. The tooling on the trimmer is adjustable over a range of sizes.

Swift Ohio Corp., Kenton, Ohio.

Use postpaid card. Circle No. 122

## WHISTLER ADJUSTABLE DIES

For Perforating and  
Notching Materials up  
thru 1/4" Mild Steel



save thousands \$\$\$ in tooling

S. B. WHISTLER & SONS, INC.  
746 Military Road, Buffalo 23, N. Y.

mail the following:

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# PRECISION MARKING \*

AT LOW COST WITH  
NOBLEWEST BENCH MODELS



Noblewest bench models represent outstanding value in machines for **permanently** indented metal marking. Available in many sizes and types from light duty to all-pneumatic models that have the features of larger, more costly floor models.

*Noblewest Precision Marking Dies cost less because they last longer.*

**NOBLE & WESTBROOK MANUFACTURING CO.**  
9 Westbrook St., East Hartford 8, Connecticut

**\* mark it best with  
NOBLEWEST**

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## Reinforced Grinding Wheels

A reinforced grinding wheel for weld grinding and light snagging has been named the Cut-N-Saucer wheel by Norton Co., its manufacturer. It combines the advantages of a saucer-shaped wheel with the convenience of a throw-away mount.

The wheel is available in 7" and 9" sizes to fit standard threaded spindles on portable grinding equipment.

Norton Co., Worcester 6, Mass.

Use postpaid card. Circle No. 141

## Disc Brake

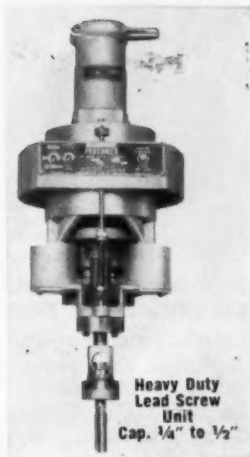
Stearns Electric Corp. has announced a 55,200 series of disc brake units. This series offers brake users a floor-mounted through-shaft brake with its own ball-bearing mounted shaft. Intended primarily for applications where it is necessary to drive through the brake, it eliminates or minimizes alignment problems. The a.c.-operated brake is available in torque ratings of 1½, 3, 6, 9, 10, and 16 lb. ft.

Stearns Electric Corp., 120 N. Broadway, Milwaukee 2, Wis.

Use postpaid card. Circle No. 142



Variable Speed  
Lead Screw Unit  
Cap.  $\frac{1}{4}$ " to  $\frac{3}{4}$ "



Heavy Duty  
Lead Screw  
Unit  
Cap.  $\frac{1}{4}$ " to  $\frac{1}{2}$ "

# AUTOMATE YOUR TAPPING

## 3 New Ways to Cut Tapping Costs!



New Lead  
Screw Tapper  
Cap. 0" to  $\frac{3}{16}$ "

## FREE DATA

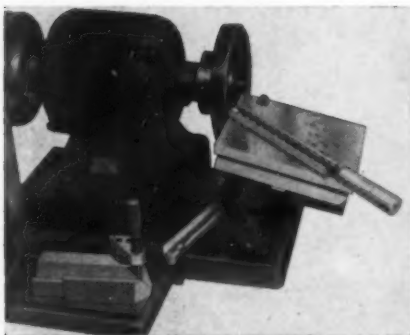
available on the 3 units illustrated. Gives specifications and sizes. Explains lead screw principle in detail. Write for circulars today!

Low cost tapping automation is here! Now anyone can install a streamlined, automated production line with a minimum investment! An automated line that will cut tapping costs to the bone, improve quality and production and practically eliminate parts spoilage. Procunier Lead Screw Units make precision tapping look easy. The special operating principle which controls the tapping action—results in uniformity and precision that is unequalled. All tapped parts are gauge perfect—all of the time! Easily adaptable to special set-ups—they offer the convenience of manual operation, with push button or foot pedal control, semi or fully automatic for cycle or jog. Plus many additional built-in quality features that insure better performance and longer life under all production conditions. If you tap large sizes from  $\frac{1}{4}$ " to  $\frac{3}{4}$ ", small parts from 0" to  $\frac{3}{16}$ " or need variable speed or single speed tapping units requiring no feeding mechanism, check into the Procunier line of Lead Screw Tapping units.

# PROCUNIER Safety Chuck Co.

14 S. CLINTON ST. • DEPT. 8 • CHICAGO 6, ILL.

Use postpaid card. Circle No. 329



### Gun-Drill Nose Grinding Simplified By Fixture

Grinding of gun-drill noses has been simplified with the development of a rocker base nose grinding fixture. Engineered by Eldorado Tool & Mfg. Corp., this fixture can be used on any bench or pedestal grinder with a diamond wheel.

The fixture has a rocker base that is set on the grinder's angle table and

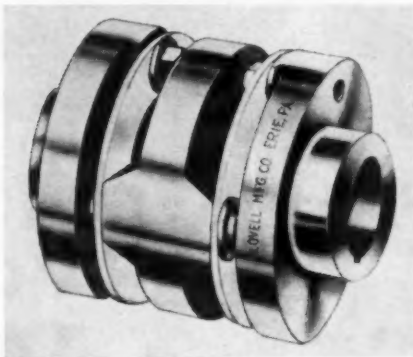
a block for holding the gun drill on the fixture. The rocker takes care of the traverse for grinding.

Eldorado Tool & Mfg. Corp., 342 Boston Post Road, Milford, Conn.

Use postpaid card. Circle No. 124

### Flexible Couplings

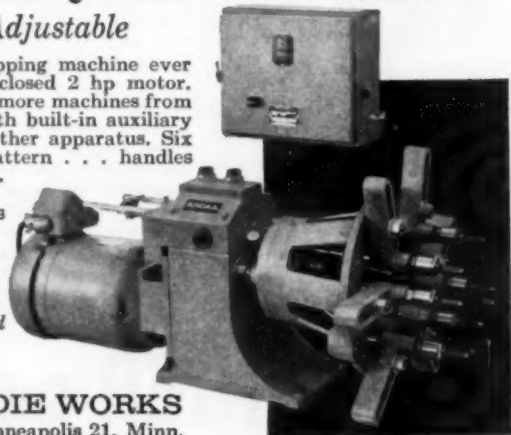
Lovell Mfg. Co. is offering three flexing member couplings. These coup-



## Capacity of six $\frac{3}{8}$ " taps... the new **ANOKA** Multiple lead screw tapping machine now yours for \$1,485

### Operate Any Position! Adjustable

Highest capacity, most rugged tapping machine ever offered at this price! Powerful enclosed 2 hp motor. Operate in any position. Work 2 or more machines from different sides in one operation with built-in auxiliary switch, or work in clusters with other apparatus. Six spindles are adjustable to any pattern... handles 6 N.C.  $\frac{3}{8}$ " taps in free cutting steel. Special adaptors for mounting on drill press columns. Lead screws of fatigue-proof steel with tensile strength of 140,000 psi; Brinnell hardness of 280 Rockwell C. Min. stroke:  $\frac{3}{8}$ ", max.: 3". Precise depth control. Here's real high production massiveness! Shop-tested for 2 years on production runs.



Write for full details

**COLUMBIA TOOL & DIE WORKS**

716 39th Ave. N.E., Dept. B, Minneapolis 21, Minn.

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lings, designed of a non-metallic material, are said to have an ideal modulus of elasticity and a flexural fatigue strength exceeding that of steel. Stock units are available for shaft diameters from 1/2" to 3 1/2". Special sizes and ratings are available.

No lubrication is required. Other advantages claimed by the manufacturer include compact size, light weight, zero backlash, and minimum loss in power transmitted.

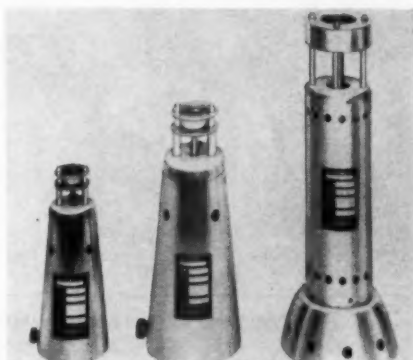
Lovell Mfg. Co., Erie, Pa.

Use postpaid card. Circle No. 125

### Ultrasonic Solder Pots

A line of ultrasonic solder pots, announced by Gulton Industries, Inc., has been developed for the electronic industry for tinning leads on diodes, capacitors, and other components.

Glennite solder pots, available in 10, 50, and 100-watt forms, have interior diameters of 3/8", 1/2" and 2" respectively. Cavitating action in the pots



clean and solder simultaneously without flux.

Capacities of the heating element in the 10-watt model are 20 or 35 watts, 50 or 75 watts in the 50-watt unit, and 100 or 200 watts in the 100-watt unit.

Vibro-Ceramics Division, Gulton Industries, Inc., 212 Durham Ave., Metuchen, N.J.

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## SOLID CARBIDE CUT-OFF TOOLS

### IN STOCK



Gashed, ready for use, in several widths for #00, 0 & 2 B&S machines. Same tool will cut either right or left hand. \*Solid carbide cutting edge brazed to threaded steel center hub to eliminate breakage.

Get all the advantages of carbide:

<b>Longer wear</b>	<b>Less Galling</b>
<b>Better finish</b>	<b>Higher speeds</b>

Plus: up to 10 times the tool life of carbide tipped tools. Somma solid carbide cut off tools combine reasonable cost with long run savings by off the shelf delivery. Write for prices and name of your representative.

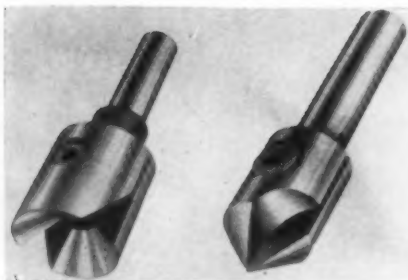
# SOMMA

TOOL CO., INC.

118 SCOTT ROAD, WATERBURY, CONN.

West Coast Warehouse: 576 N. Prairie, Hawthorne, Cal.

Use postpaid card. Circle No. 331



### **Cutting Tools Eliminate Chatter and Burrs**

Clean deburring, countersinking, and chamfering are said to be assured with Precision Tools and Products Co.'s adjustable countersinks and O.D. chamfering tools. Each tool is made of M2 high-speed steel. A slot is cut back from the working end, with the two sections brought together by an adjusting screw (shown). By altering this

**FOR THE MECHANIC WHO TAKES PRIDE IN HIS JOB**



## **NEW WILSON PORTABLE AIR DRILLS**

New Wilson Series 93 air drills are powerful and compact. They have a drilling capacity up to  $\frac{3}{8}$  in. You have a choice of 7 speeds for efficient drilling of a wide range of materials. Available in straight models with lever or pushbutton throttle and offset grip models with trigger throttle.

All Wilson portable pneumatic production tools are lightweight, compact, designed for easy handling.

• **Catalog PT-58 gives all the facts. Write for your copy.**

TW917

**THOMAS C. WILSON, INC.**

21-11 44th Avenue, Long Island City 1, New York

**BETTER TOOLS FOR BETTER WORK**

adjustment during setup, the cutting edge is brought out-of-round, creating the clearance angle desired. The tools are self-centering, and can be hand-fed, even on interrupted cuts.

Since the clearance angle is adjustable, these tools can be used on materials such as steel, aluminum, brass, plastics, and laminates. The countersinks are available in standard angles of 60°, 82°, and 90°. The chamfering

tools in 60° and 90° angles. Both units are offered in sizes up to 3½" diameters.

Precision Tools and Products Co., 1 Washington Ave., Providence 5, R.I.

Use postpaid card. Circle No. 127

### Journal Bushings Capable of Heavy Dynamic Loads

A line of self-lubricating, plain, journal bushings, capable of dynamic

**CUT PRODUCTION COSTS!**

**MARK**

**NAME PLATES**

**5 TIMES  
FASTER**



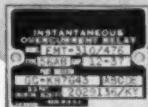
MODEL EMT-2

**ELECTRIC TAG TYPEWRITER**

A touch of the finger delivers up to 2 tons pressure for deep, legible impressions in metal or plastic tags.

**-WITH-  
Automark®**

**ELECTRIC TAG MARKING MACHINES**



MODEL SRST-2

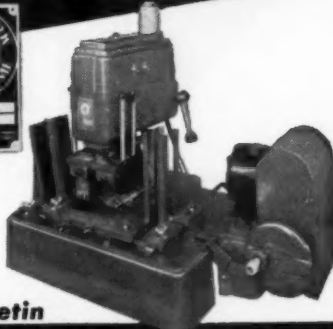
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**TAG MARKING MACHINE**

Automatically marks BOTH constant and serial numbers at any desired speed up to 8,000 tags per hour!

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**DEFIANCE MACHINE & TOOL COMPANY**

1920 S. VANDEVENTER

Dept. MT

ST. LOUIS 10, MO.

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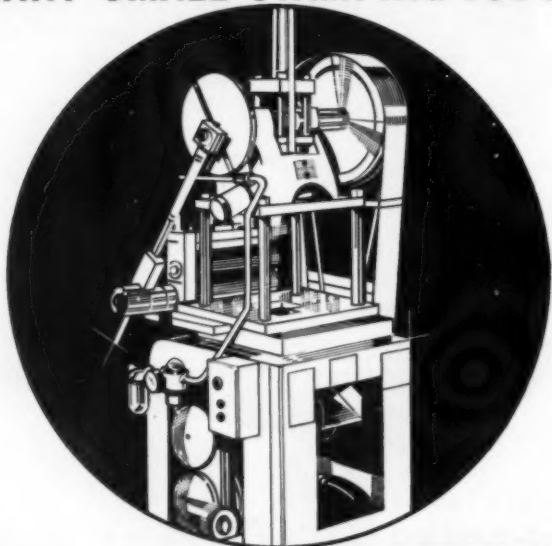
loads to 25,000 psi and static yield loads to 50,000 psi at low rotational speed without damage, is now being offered by Southwest Products Co.

Stainless steel housings are employed and the bushings have a plastic alloy insert made of Dyflon. Bore sizes are from  $\frac{1}{4}$ " to 3".

Southwest Products Co., 1705 S. Mountain Ave., Monrovia, Calif.

Use postpaid card. Circle No. 128

## NEED ONE PRESS TO DO MANY SMALL STAMPING JOBS?



The Big H has it . . . the 16 Ton Havir Auto-Press.  $11\frac{1}{2}$ " x 15" expanded bed for most large, light-weight materials. Fast too. Stamps up to 600 spm.

Get longer die-life with exclusive cylindrical ram, bigger and better bearings, positive parallelism of ram and die. *Write for details.*

**HAVIR MANUFACTURING CO.**  
438 Cleveland Ave. • St. Paul, Minnesota

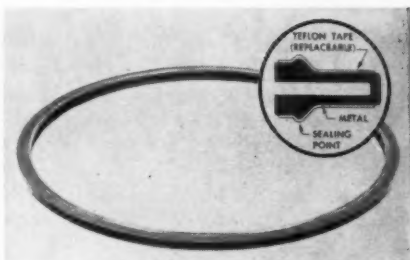
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### Cryogenic Metal Seal

A cryogenic metal seal, used in rocket engines, is now being marketed by Rocketdyne, a division of North American Aviation, Inc., as an "off-the-shelf" item.

This seal, called "Naflex," provides leakproof sealing through high and low extremes of pressure. It requires lower bolt and flange loads than those neces-



**FOR PEAK TOOL BIT  
PERFORMANCE  
PICK**



# SUPREME

Use this unique steel for the very ultimate in cutting prowess. Highest hardness, highest wear resistance make **Vasco Supreme** the aristocrat of the shop when you want the most! Where production economics call for different bits, use **Neatro**, **Red Cut Superior**, **Red Cut Cobalt**—each a profit-maker in its range. *Write for Data Sheets.*

**VANADIUM-ALLOYS STEEL COMPANY  
LATROBE, PENNSYLVANIA**

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sary for gaskets and for most other types of seals. It is repeatedly reusable.

This standard cryogenic seal comes in aluminum with Teflon covered sealing points and is now available in sizes ranging from 1" to 20".

Rocketdyne, a division of North American Aviation, Inc., 6633 Canoga Ave., Canoga Park, Calif.

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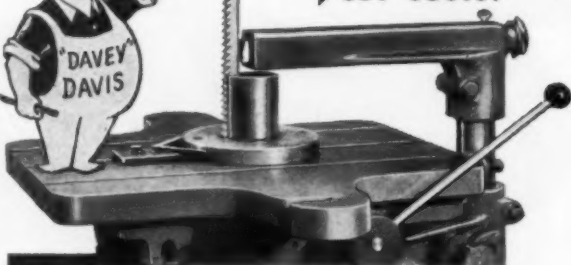
### Cold-Impact Extruded Sockets

A socket set that features more drive power and versatility than sets twice its size has been introduced by J. H. Williams & Co. Made by a cold-impact extrusion process, these eleven sockets range from  $\frac{3}{8}$ " to 1", by sixteenths. They are made from billets cut from commercial bar stock and are pre-formed into slugs, softened by spheroid-

## Little "Davey" says: **DAVIS KEYSEATERS**



- ▶ CUT FASTER!
- ▶ CUT TIME!
- ▶ CUT COSTS!



**WRITE  
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FREE  
Literature**

"Davey" knows that machinists' time is valuable today and that by using the Davis multiple tooth cutter principle, time is cut to a fraction of the single tooth method. Adjustments are held to a minimum and cutting speed is always maximum, regardless of size or length of cut, or the material being worked. Simple to use even for an unskilled operator. Many of our original models are still giving efficient service after years of use. Tell us your problem. We'll be glad to help solve it.

## **DAVIS KEYSEATER COMPANY**

Division of Honsford Manufacturing Corporation  
3115-H Winton Road South  
Rochester 23, New York

Use postpaid card. Circle No. 336

izing, and then lubricated with a special phosphate coating. When fed into the die cavity of the press, impacting pressure drives the metal upward and around the punch to form contoured drive and nut openings to final specifications in two separate, opposite-end operations.

J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N.Y.

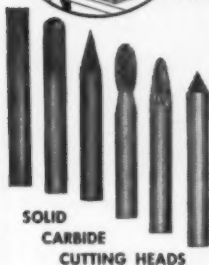
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# NEW BALANCED CUTTING ACTION **Severance** **ECARNO-MILLS**

THE ECONOMY MILL NEW DESIGN NEW CARBIDE

Make your money count! Replace more  
H.S. Rotaries and Mounted Grinding Points.



SOLID  
CARBIDE  
CUTTING HEADS

22 Shapes and  
Sizes Available



A NEW  
LOW PRICED  
HIGH CLASS  
PERFORMER



YOUR  
SPECIAL  
DEBURRING  
PROBLEMS  
ARE SOLICITED

Made by the originator of ground-from-the-solid Rotary Files, and pioneer in this type of Carbide Mill, who presently offer the largest range of standard types, shapes, and sizes.

OPERATE EFFICIENTLY AT USUAL CARBIDE SPEEDS, YET PERFORM BEAUTIFULLY AT THE SLOWER SPEEDS OF STEEL CUTTERS

PHONE, WIRE, OR WRITE US NOW  
FOR PRICES

**Severance TOOL INDUSTRIES INC.**

722 Iowa Ave., Saginaw, Mich.

Ask for a Severance Catalog today!

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### Short Run Air Gaging

Standard Gage Co. has introduced a complete selection of adjustable, manual air gages. Designs which have been proven in actual use for as many as 20 years are now adapted to air. They include bore gages that are available in seven sets to cover I.D.'s from 0.123" to 24"; and twelve adjustable airsnaps cover all O.D.'s from zero to 12".

Other adjustable manual gages cover

such types as shallow diameter gages, P.D. comparators, and regular bench-type comparators.

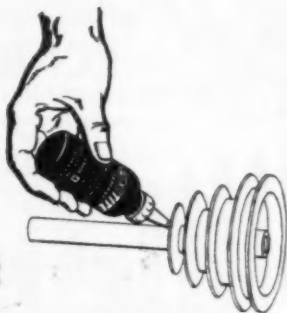
Standard Gage Co., Inc., Poughkeepsie, N.Y.

Use postpaid card. Circle No. 131

### Single-Station Die

Richards Tool & Mold Co. has announced a single-station die especially designed for automatic cycling and in-

**Simplify  
and  
speed  
any shaft  
assembly with  
LOCTITE®**



LOCTITE Sealant, "the liquid lock for metal parts," eliminates press fits, shaft distortion, keyways, set screws, etc., when assembling fans, pulleys, couplings, impellers, gears, rotors, armatures, etc. LOCTITE ends repairs and loosening caused by vibration. Simplify your production methods with LOCTITE Sealant.

*Call your distributor, or write  
for literature and free samples.*

**LOCTITE® SEALANT**

**AMERICAN SEALANTS COMPANY**

**455 North Mountain Road, Hartford 11, Connecticut**

Use postpaid card. Circle No. 338

corporating side core pulls. The unit features removable sections on either side so die casters can incorporate side core pulls for each or any of three sides. This unit has an added automatic kicker pin for positive ejection of molded products.

Other features include: ball-bearing seated leader pins; removable solid pillar post in back; additional locking pins; special arrangements of offset

alignment screws; and insertion in vertical position.

Richards Tool & Mold Co., Racine, Wisconsin.

Use postpaid card. Circle No. 132

### Milling Cutter Pumps Coolant

An inserted-blade face mill, designed by Wesson Corp., makes use of centrifugal force to deliver coolant where it is needed. In the body design, a

**UNIFORM TEMPERATURE  
...PRECISE CONTROL**  
*Get both with* **COOLEY**  
a complete line of heat treating  
**FURNACES and OVENS**

Cooley's exclusive Thermoshell heating units assure rapid heating, better heat distribution. Thermoshell coils are permanently embedded in special ceramic material that resists corrosion, fights oxidation, insures longer coil life. Readily available from stock, Thermoshell units can be replaced in minutes without dismantling furnace. For over 28 years highest quality electric furnaces and ovens for hardening, tempering, annealing, drawing, drying, baking and enameling have come from Cooley. A wide range of standard sizes is available.

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**COOLEY**

**COOLEY ELECTRIC MFG. CORP.**

36 S. Shelby Street • Indianapolis 7, Indiana

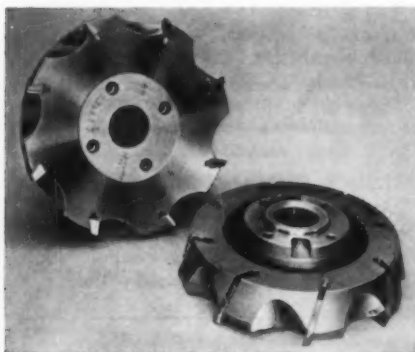
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MODEL  
U-75 SM

**CHECK FIRST WITH  
COOLEY FOR:**

- ✓ GAS ATMOSPHERE  
TOOL ROOM FURNACES
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- ✓ BENCH TYPE FURNACES
- ✓ HIGH SPEED ELECTRIC FURNACES
- ✓ ELECTRIC RECIRCULATING OVENS
- ✓ INDUSTRIAL BOX FURNACES



groove in the back face of the cutter acts as a reservoir and centrifugal force pumps the coolant through the  $\frac{1}{4}$ " radial holes to the blades.

On aluminum automotive parts manufacturing, cutting speed of this 8.24" diameter cutter was 7776 sfpm with a feed rate of 158 ipm. The cutter was

mounted on a motorized spindle, rotating at 3600 rpm.

Wesson Corp., 1200 Woodward Heights Blvd., Ferndale 20, Mich.

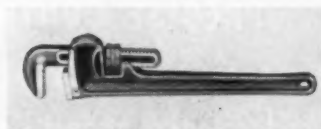
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### Malleable Pipe Wrenches

A line of malleable pipe wrenches by Armstrong Bros. Tool Co. is offered in a range of sizes with lengths of 6", 8", 10", 12", 14", 18", 24", 36", and 48". Opening sizes range from  $\frac{1}{8}$ " to 6". Easy adjustment, drop-forged calibrated hookjaw, and double-action spring are features of this wrench.

Armstrong Bros. Tool Co., 5200 W. Armstrong Ave., Chicago 46, Ill.

Use postpaid card. Circle No. 134



## MACHINE PRODUCTS PRECISION EQUIPMENT

- INCREASES ACCURACY
- REDUCES REJECTS

- SPEEDS SETUPS
- CUTS COSTS

You'll hold closer tolerances and increase efficiency, too, when you use Machine Products precision surfaces. Because the combination of superior materials, skilled craftsmanship and rigid quality controls in the manufacture of Machine Products equipment assures you of the precise dimensional accuracies you require. A complete line of plates and accessories is available, so send for your free catalog today.

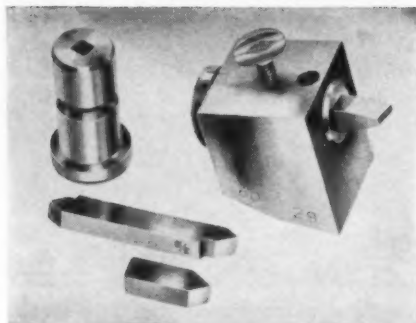


### MACHINE PRODUCTS CORPORATION

6771 E. McNichols Rd.

Detroit 12, Michigan

Use postpaid card. Circle No. 340



### Thread Tool Grinding Fixture

A surface grinder fixture, designed for grinding internal and external V 60° and Acme 29° threads, has been introduced by MRCO Tools Co.

This fixture comes in two styles: model A handles separate barrels for 3/16", 1/4", 5/16", and 3/8" tool bits, model B handles the barrel for 1/2" and 5/8" bits.

Tool clearance is established by ro-

tating the barrel to each side of the centerline on the fixture. Round bit holders and fixtures for grinding special shapes are also available.

MRCO Tools Co., 2742 Chene St., Detroit 7, Mich.

Use postpaid card. Circle No. 135

### Precision Die-Cut Wrenches

Dayton Rogers Mfg. Co. is now producing open-end and box wrenches, spanner wrenches, and other special wrenches. They can be made of practically any type of sheet alloy, and can be furnished with or without heat treating.

Wrenches up to a length of 22", varying in material thicknesses from the minimum to an overall thickness of 3/8", can be produced with a finish that is free from burrs.

On the wrenches shown, the contour and dimensional tolerances are held to a maximum of .005". Closer tolerances

## How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:  
3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

**STURDY BROACHING SERVICE, INC.**  
23516 TELEGRAPH ROAD • SOUTHFIELD, MICH.

*Write for  
Literature*



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## SINE BARS

5" x 5/8" sine bar \$42.00  
with hardwood case \$46.50

5" x 3" sine plate \$73.00  
with hardwood case \$78.50

Quality sine bars made from alloy steel hardened for maximum wear and deep frozen for maximum stability. Guaranteed accuracy of .00015 axial distance. Rolls matched to .00005.

Dealer Inquiries Are Invited

**ADAM TOOL CO.**

50 East 11th Street New York 3, New York

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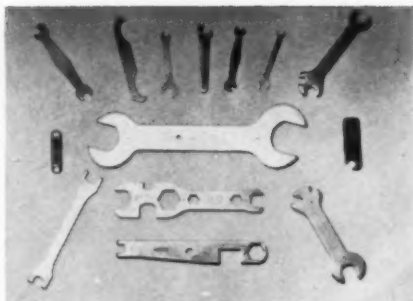


## DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD  
Your business letterhead will bring literature

**WATTS BROS. TOOL WORKS**  
Wilmerding, Pa.

Use postpaid card. Circle No. 343



can be obtained on thinner special types.

Dayton Rogers Mfg. Co., 2824 13th Ave. South, Minneapolis 7, Minn.

Use postpaid card. Circle No. 137

### Spring Allows Deeper Taps

A spring for use on No. 2" to 3/4" sizes of Burr-Bit tapped hole deburring devices has been announced by Vernon Devices, Inc. This type of spring can be used with either the two-lip or



# FREE

## 84 PAGE CATALOG

One Complete Source of Detailed Specifications for Designers,  
Production Managers, Toolroom Foremen

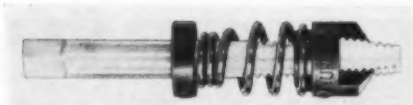
### Hundreds of NEW ITEMS

ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of work-holding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application. Write for your FREE copy today.

## JERGENS TOOL SPECIALTY CO.

Dept. MT-8 712 E. 163rd St., Cleveland 10, Ohio

Use postpaid card. Circle No. 344



three-lip Burr-Bit, also made by Vernon.

This spring can also be used on all tap chucks and holders, even those gripping the entire tap shank.

The depth of chamfer can be varied with this spring.

Vernon Devices, Inc., 491 E. 3rd St., Mt. Vernon, N.Y.

Use postpaid card. Circle No. 138

### Spoutseal Oiler

Mizim Mfg. Co. has introduced a spout-seal oiler for hard-to-get places. It delivers oil, thinners, or solvents in a drop or steady stream by pressure of its plastic container.

This oiler is an unbreakable, flexible, and dielectric construction which is leakproof and easy to store. It is not

## New American Standard's PRECISION SURFACE GAGE

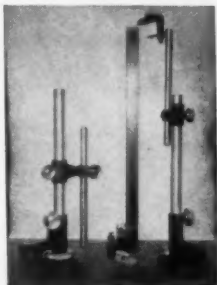
PATENT PENDING

The exceptionally smooth fine adjustment is in a vertical plane and all backlash is virtually eliminated. Working range is from Zero to 20" in height. With the use of an extension rod any height may be measured.

A sturdy well built tool. Weight 6 lbs. Even extended to 20" in height, you will be able to work with confidence and repetition with a .0001 Indicator.

**PRICE**  
**\$20.00**

Without Indicator

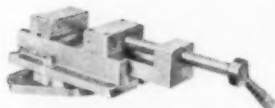


**AMERICAN STANDARD  
COMPANY**

PLANTSVILLE, CONNECTICUT

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## New Design Hardened and Ground Vises

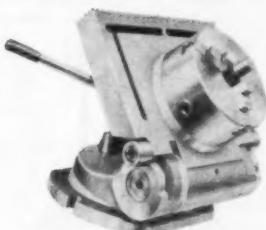


### MACHINE VISE:

Jaws guaranteed not to lift  
Large Capacity  
Plain or with swivel base

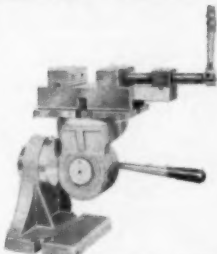
### Specification:

Maximum opening of jaws:  
Type A 4-59/64"  
Type B 7-7/8"



### UNIVERSAL TILTING TABLE:

May be used with vise or three jaw chuck.  
Double locking device prevents movement to table or swivel when locking in position.  
Table will not vibrate . . . even under heavy cutting.



### THREE-WAY SWIVEL VISE:

All mating surfaces on swivels are under spring tension to prevent the entrance of dirt or chips.

Versatile . . . Accurate

### Prices

### MACHINE VISES:

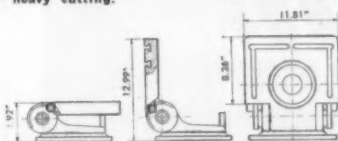
Type A, with swivel . . . \$130.00  
Type B, with swivel . . . 170.00

### TILTING TABLE: with

Chuck Plate . . . 398.00  
(less chuck and dividing plate)

### THREE WAY VISE:

with Vise . . . 185.00  
F.O.B. Westbury, N.Y.



**AMITOOL COMPANY, INC.**  
629 MAIN STREET  
WESTBURY, L.I., N.Y.

Use postpaid card. Circle No. 346



## RICE MILWAUKEE DIE FILERS

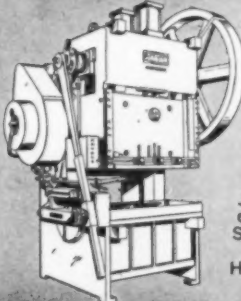
The Complete  
Die-Making Machines  
for all operations . . .  
**FILING — SAWING  
LAPPING**

- Work table tilts 4 ways
- 11", 13" and 18" table sizes
- Choice of 2 or 4 speeds or infinitely variable, 100 to 475
- Improved overarms
- You can dial correct speed and stroke with Model FS-VSS

Send for Bulletins on the complete Rice-Milwaukee line of Die-Filers and Profile Grinders.

**RICE PUMP & MACHINE CO.**  
226 PARK AVE., BELGIUM, WISCONSIN  
In Milwaukee's Great Industrial Area

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Write  
today for  
BULLETIN

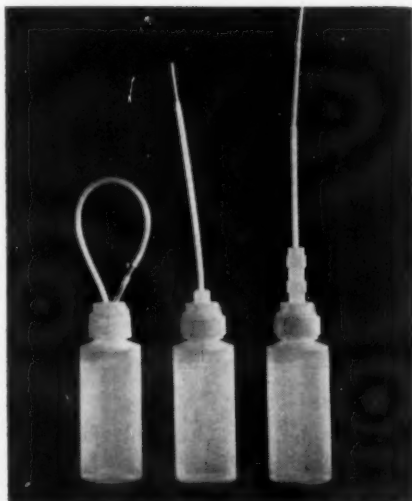
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"specs" on  
Johnson line  
of Inclinable,  
Straight Side,  
Gap and  
Horn Presses.

# Johnson

**POWER PRESSES**

JOHNSON MACHINE & PRESS CORP.  
620 W. INDIANA AVE., ELKHART, INDIANA

Use postpaid card. Circle No. 348



affected by thinners, other solvents, and most acids.

It is refillable and the supply is visible.

Mizim Mfg. Co., P.O. Box 102, Hazel Park, Mich.

Use postpaid card. Circle No. 139



### Self-Tapping Insert Kit

A kit of self-tapping inserts for use in experimental and prototype work has been introduced by Groov-Pin Corp. The kit includes a representative selection of various types and sizes of standard Tap-Lok inserts as well as seven different installation tools. With this material, the user can select, insert, and test Tap-Lok installations in woods, plastics, or soft metals.

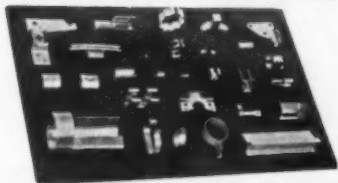
Groov-Pin Corp., Ridgefield, N.J.

Use postpaid card. Circle No. 140

### Inertia-Type Gear Analyzer

A compact rolling fixture type of gear analyzer that utilizes inertia principles and electrical indicators to provide three simultaneous precision measurements of gear tooth accuracy has been developed by National Broach & Machine Co. This analyzer will detect nicks on tooth profiles as small as 0.0005" high. It has a pivoted motorized master gear that is meshed with the gear to be inspected and rotated. Center

### New Federal COMBIN-O-TOOL Method Saves up to 46% on Short Run Stampings



Some typical parts produced by Federal Combin-O-Tool Method.

Combined operations mean lower cost short run stampings whenever they can be produced by the Federal Combin-O-Tool Method.

Where it formerly took 4 or 5 operations—it can now be done by Federal with only 2 or 3 operations. The labor savings are passed on to you in lower cost stampings. Send your prints or parts today to see if they can be done with the new Federal Combin-O-Tool Method. The savings will please you.

# FEDERAL

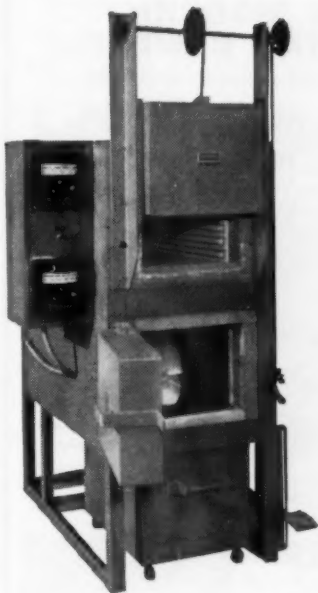
SHORT RUN STAMPINGS

Federal Tool & Mfg. Co.  
3610 Alabama Ave., Minneapolis 16, Minn.  
Federal Short Run Stampings, Inc., 910 Lyell, Rochester, N.Y.  
Federal Stamping Company, 7310 Atoll, N. Hollywood, Cal.

Use postpaid card. Circle No. 349

August, 1961

3 PLANTS  
To Serve You Better



Two series (8012 and 8008) of "space saver" combination heat treating furnaces are produced by Lucifer Furnaces, Inc. Hardening, drawing or preheating, and quenching operations can be performed with one furnace. Each furnace has separate controls permitting independent operation of each unit. The 8012 series chambers operate at 2300, 2000 and 1250°F.; while the 8008 series chambers reach 2300, 2000, and 800°F. The furnaces operate on standard line voltage . . . no transformer necessary. Twenty standard low-cost models are available and each is a complete unit . . . just connect to power supply.

For information about the "space savers", our complete line, or free engineering advice, call on . . .

**LUCIFER FURNACES, INC.**

Neshaminy 1, Pennsylvania

Diamond 3-0411

Use postpaid card. Circle No. 350

LUCIFER "SPACE-SAVER" COMBINATION HEAT TREATING FURNACES

## NEW MODERN VISUAL CONTROL

FOR GREATER EFFICIENCY

### MOVICHART

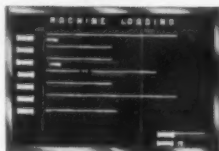
GRAPHIC CHART SYSTEMS



- Vivid, easy-to-read
- Quick, easy to maintain
- Durable, non-breakable plastic parts
- Attractive colors

- Progress Chart
- Incentive Charts
- Machine Loading
- Staff Location
- Machine Maintenance
- Production Planning
- Safety Record
- Quality Control

#### LOOK AT THE FACTS NOT FOR THEM



Movichart pictures facts as they are and warns in advance of trends that may require your action, provides the information you need in time to make right decisions. The easiest, quickest to use, and small attractive system available today.

Free Details On Request

### PRYOR MARKING PRODUCTS

434 S. WABASH AVE. • CHICAGO 5, ILL.

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distance movements of the master gear are detected by three electrical indicators to provide separate measurements of work gear tooth eccentricity, tooth-to-tooth variation, and tooth oversize and undersize conditions.

This fixture has a 22½" by 15" cast-iron base and a universal motor that drives the pivoted master gear shaft with a timing belt. The electric indicators on the fixture have repeat accuracies of less than .0001". Center distance capacity of the fixture is from 17/8" to 12-15/16". An adjustable-spring mesh control keeps the master gear in contact with the work gear during the inspection operation.

National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

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### Drop Forgings Automated

Chambersburg Engr. Co., has introduced three units for the automatic production of drop forgings in jobbing

### NEW . . . Portable

#### JEFFERSON "601" P Power Hacksaw

5" x 4". All cast construction, Oilite bearings, 45° swivel vise, 7" ball bearing wheels, motor, ready-to-go.

ONLY

**\$114.50**

F.O.B. Factory

KELLER Power Hacksaws are available in 5 sizes, 12 models.



Ask your Industrial Distributor or write:

2361 University Ave.

**Sales Service Mfg. Co.**

St. Paul 14B, Minn.

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### Plain Type

TRADE

AUTOM

MARK

### Offset Type

## CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to suit the job.

THREE-FOURTHS  
OFFSET

### AUTO MOULDING

& MFG. CO.

1110 E. 87TH ST.

CHICAGO 19, ILL.

Use postpaid card. Circle No. 353

#### SPECIFICATIONS

Open width 7/8" to 6"  
Gage Material .040 to .187"  
Pin Diameter .093" to 1/8"  
Lengths to 120"

SEMI-OFFSET

lot quantities. Each unit consists of a model C Impacter, a program-controlled feed device, and an automatic gas-fired furnace. Three sizes are being offered to accommodate a range of drop forgings usually made in gravity drop hammers from 1,000 lb. to 3,000 lb. fall-ing weight or in comparable sizes of forging presses.

The Model "C" has striking rates that permit the rapid working of the forging stock which is manipulated through the various die impressions by the traveling tongs of the programmed controlled feed device.

The brain of the process is the com-prehensive control panel on which are mounted all the selectors and electrical controls. The unit is equipped for five separate die stations at which up to 10 blows of pre-selected energy may be struck. Changes in program are made even while the process is in operation.

continued

## RIVETERS.

# GRANT

PIONEERS  
and  
PACEMAKERS  
in their line



head rivets from smallest to 3/4" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Ver-tical and Horizontal Multiple Spindle.

Write for literature and don't forget to send sample.

**THE GRANT MFG. & MACHINE CO.**  
CE Station Bridgeport 5, Conn.

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August, 1961

For Small Precision Work  
You Need The . . .

## LINLEY JIG BORER



The Linley will meet the most exacting requirements and save you money by releasing your larger bor-ers for heavier jobs. It's a precision tool . . . Ver-satile and flexible; easy to set up and fast oper-ating. Write to receive complete information on the many improvements that are now standard.

Table Size: 7" x 17 1/2"

Table Travel: 6 1/2" x 10"

**LINLEY BROTHERS CO.**

663 State St. Ext., Bridgeport 1, Conn.

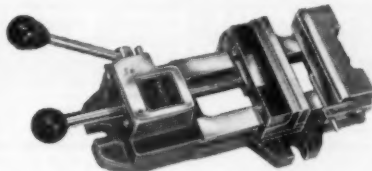
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NEW

## LASSY Rapid LOX

INSTANT ACTION—"THRED LOCKED" VISE

Assures Powerful Dependable Clamping With  
Instant Jaw Positioning.



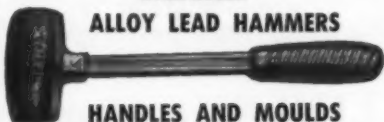
Patented

- Jaw Pressure Is Selective and Repetitive.
- Ideal for Milling, Drilling, Grinding and Jig Boring—of One Piece or Thousands.

Order from Your Industrial Supplier  
Mfg: Lassy Tool Co., Plainville, Conn.

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**BALANCED  
ALLOY LEAD HAMMERS**



**HANDLES AND MOULDS**

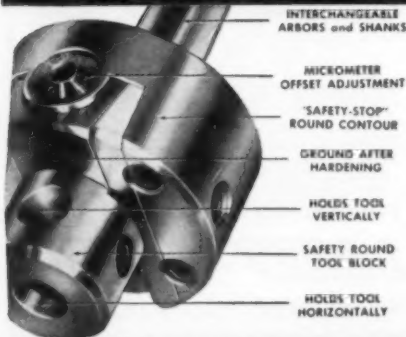
1, 1½, 2½ and 5 lb. sizes—order your alloy lead hammer requirements from your mill supply house.  
or direct from:

**KITZMAN MFG. CO.**

Manufacturers Of Lead Hammer Products  
15061 Hartwell Ave. Detroit 27, Mich.

Use postpaid card. Circle No. 337

**7 REASONS WHY  
FLYNN BORING HEADS  
ARE MOST USED**



INTERCHANGEABLE  
ARBORS and SHANKS

MICROMETER  
OFFSET ADJUSTMENT

"SAFETY-STOP"  
ROUND CONTOUR

GROUND AFTER  
HARDENING

HOLDS TOOL  
VERTICALLY

SAFETY ROUND  
TOOL BLOCK

HOLDS TOOL  
HORIZONTALLY

**LEADING NAME IN  
BORING HEADS FOR 40 YEARS  
19 MODELS** Write for catalog

**FLYNN MANUFACTURING CO.**  
18301 WEAVER • DETROIT 28, MICH.

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Numerical control, manual, tape or cards, are applicable.

The Cecomatic Process is being offered as an integrated production unit complete with a gas-fired furnace designed expressly for the rapid heating of cut lengths of bar stock.

Chambersburg Engr. Co., Chambersburg, Pa.

Use postpaid card. Circle No. 144

**Turret Indexing Chassis  
Has Overhead Tool Plates**

A turret indexing machine chassis which employs double overhead tool plates for mounting and actuating operational tooling has been announced



"What about this ridiculous rumor, David, that you scrapped every part you turned out today?"



IN 11 SIZES—No. 6 to 1"  
N.C. In all S.A.E. sizes.



**You Need an Extra Hand Now  
to Speed Up Production!**

**HEIMANN TRANSFER SCREW SETS**

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

**HEIMANN MFG. CO. • URBANA, OHIO**

Use postpaid card. Circle No. 339

by Swanson-Erie Corp. This series SD has been engineered for high-speed, comparatively light, sequential assembling and processing operations, and is offered in a wide range of turret diameters, index positions, and work cycles.

Utilizing the dual motion method of multiple piece-part assembly, the self-contained chassis offers positive parts control, reduced jamming potential, design simplicity, tooling accessibility, and tool standardization.

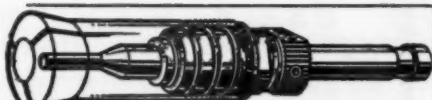
A major portion of the tooling on the SD may be mounted on and actuated by a pair of tool plates center mounted above the indexing turret. The plates are designed to move up and down with a definite relative motion synchronized by cam actuation with the main indexing cam shaft. This design feature mechanically times and interlocks the motions for work transfer and tool actuation.

Tools are centermounted, facing outward, with provision for feeding, probing, orienting and parts escapement. Such tooling as hoppers and processing equipment can be mounted on external brackets around the outside of the turret and actuated mechanically by cams and levers operated from the main cam shaft or auxiliary countershafts.

Controlled indexing of the turret is accomplished by use of cycloidal-displacement hardened steel cams.

Swanson-Erie Corp., 816 East 8th St., Erie, Pa.

Use postpaid card. Circle No. 145



### NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position. Will not distort collet. Will not move back. Also available for other collets and spindles. 30 Days Free Trial. Several Territories Open for Distributors.

Write for Bulletin

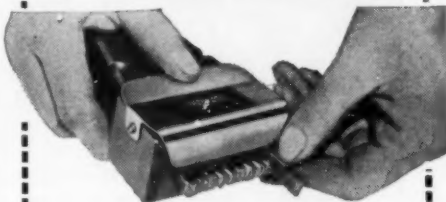
### THE BYSTROM COMPANY

6106 Park Ave. South Minneapolis 17, Minn.

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for—

## "Quick-Change" NUMBERING



"Hercules Holders and Heavy Duty" Shoulder Style Type from stock for your difficult numbering jobs.

Write for  
New  
Pocket  
Catalog  
and  
Price List

**ACROMARK**  
Company

15 Morrell St.  
Elizabeth 4, N.J.

"THE ORIGINAL MARKING SPECIALISTS"

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## Wesco COOLANT UNITS

The pump system at left is simple in design and low-priced . . . for jobs which circulate coolant containing grit and abrasives.

Wesco mist coolant system at right operates from any air line. 25 lbs. to 150 lbs.

Write for complete details.



MODEL 1025



MODEL 100

**Wesco TOOL, INC.**

2820 SAN FERNANDO BLVD. • BURBANK, CALIFORNIA

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## USE SAWS? HACK • BAND • CIRCULAR

### KEEP THEM SHARP!

Automatically • Economically

Learn How—Write Today!



**WARDWELL Mfg. Co.**

3807 Ridge Rd., Cleveland 9, O.

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## Nielsen HEAVY DUTY Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

**NIELSEN, INC.**  
LAWTON, MICH.

WRITE FOR CATALOG ON LIVE CENTERS

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## Die Polisher

The Parker-Hartford Corp. is now manufacturing a die polishing machine for grinding and polishing contact surfaces of carbide and steel round core extrusion and draw dies. It utilizes an endless abrasive belt driven at 5000 rpm to polish the die parallel to the line of draw. It is suitable for polishing new dies as well as reworking worn ones.

Featured is an angle polishing fixture, which will maintain die manufacturers' specifications on approach, back relief angles, and bearing sizes with highest accuracy.

The Parker-Hartford Corp., Hartford, Conn.

Use postpaid card. Circle No. 146

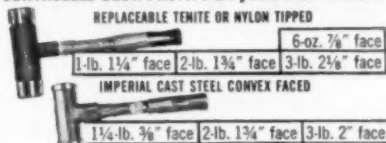
## Master Vernier Height Gage

A new series of master vernier height gages, combining correct balance and weight for easy handling in applica-

## T AHLEN NO-BOUNCE HAMMERS

CONTROLLED BLOW PROFITS are yours with TAHLSENS

REPLACEABLE TENITE OR NYLON TIPPED



6-oz.  $\frac{7}{8}$ " face  
1-lb.  $1\frac{1}{4}$ " face 2-lb.  $1\frac{3}{4}$ " face 3-lb.  $2\frac{1}{4}$ " face

IMPERIAL CAST STEEL CONVEX FACED

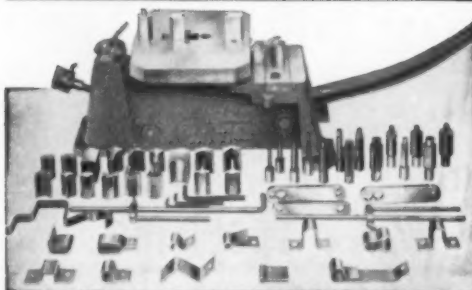
1 $\frac{1}{4}$ -lb.  $\frac{3}{8}$ " face 2-lb.  $1\frac{1}{4}$ " face 3-lb. 2" face

WRITE for folder, prices and nearest Distributor

Dept. M-8 **TAHLEN HAMMER CO.**

1729 1st South, Seattle 4, Washington

Use postpaid card. Circle No. 365



## Multiform BENDER CUTTER

### BENDS, CUTS, PUNCHES

Available in hand, air and hydraulic models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend, and cut round or flat brass, bronze, aluminum, steel, etc., up to  $\frac{1}{2}$ " x  $1\frac{1}{2}$ " as illustrated, other models up to  $\frac{1}{2}$ " x 8".

**J. A. RICHARDS CO.**  
DEP. 6B, KALAMAZOO, MICH.

Use postpaid card. Circle No. 366

tions where a lighter weight gage is preferred, has been developed by The L. S. Starrett Co.

Available in 12" and 18" sizes, these gages feature a 50-division vernier with widely spaced, easy-to-read graduations to simplify setting and reading without the aid of a magnifying glass. The "open-face" design also permits having half as many bar graduations as conventional vernier tools.

The vernier scale is flush-fitted in the same plane as the main scale to insure alignment of matching lines on bar and vernier with no parallax problems to cause reading errors.

Other features include: satin-chrome finish on all reading surfaces; master bar hardened and stabilized for rigidity and lasting accuracy; and combination straight and angular ways for alignment of bar and slide.

The L. S. Starrett Co., Athol, Mass.

Use postpaid card. Circle No. 147

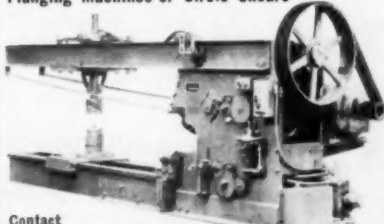
### High-Capacity Tester For Sheet Metal to 5/16"

A high-capacity testing machine for predicting the drawing qualities of sheet metal has been announced by the Tinius Olsen Testing Machine Co.

With this 70,000 lb. capacity Ductomatic sheet metal tester, specimens to 5/16" can be tested using either the standard ductility cup, the deep draw cupping, or the hole expansion methods. The machine duplicates production press operations in the laboratory. Scrap losses and rework costs are minimized. Die life is prolonged by rejecting defective material before it is formed.

Interchangeable tools permit the conducting of all three testing methods with a wide range of materials for production or research/development testing. Clamping pressure to 8000 lbs can be regulated for determining the proper pressure to eliminate folding or crack-

### Flanging Machines or Circle Shears



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ing in deep draw press operations.

This unit has a 3" stroke, and measures 22" in width, 20" in depth, and 68" in height. Large gages show the clamping pressure as well as load applied. Two range capacities, 7000 lbs. and 8000 lbs., are provided. An optional electronic shut-off is available for automatically stopping the test as soon as a crack appears in the specimen.

Tinius Olsen Testing Machine Co.,  
Easton Road, Willow Grove, Pa.

Use postpaid card. Circle No. 148

### Pipe Cutting Machine

Stone Machinery Co., Inc., has developed a rotating cutting machine for use on pipe, round solids, and tubular extrusions of virtually any length and dimension.

Developed to trim 11' lengths of nickel chrome alloy centrifugally cast steel pipe ranging from 4 $\frac{5}{8}$ " to 12 $\frac{3}{4}$ " diameter, the initial machine in this series cuts size 10 $\frac{3}{4}$ " OD x 9 $\frac{5}{8}$ " ID in less than 3 minutes, with no change in characteristics in the metal.

This Stone pipe cutting machine is equipped with a full 10 hp TEFC ball-

**Get this Completely**

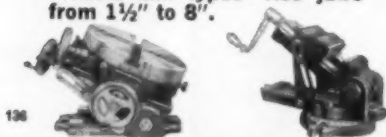
**PALMGREN**

**Illustrated**

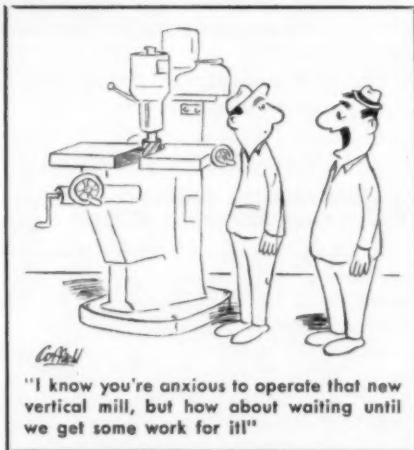
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**THE DYKEM COMPANY**  
2301G North 11th St. • St. Louis 6, Mo.

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bearing, geared-in-head motor at each end. The machine is 13' long, 6' wide, and weighs approximately 3 tons.

Stock is held in position on opposing banks of self-centering hard-rubber faced support wheels spaced the length of the machine and by pressure rollers located near each cutting head. Accuracy is achieved by the use of a spring loaded kerf follower located directly under cutting wheel at base of stock.

Dust and cuttings are exhausted to the rear through special housing.

Stone Machinery Co., Inc., Manlius, New York.

Use postpaid card. Circle No. 149

### Pedestal Mounted Shaft Machine

Stow Manufacturing Co. has put on the market a flexible shaft machine, that is pedestal mounted.

Called the "Lightning" flexible shaft machine, it operates at 1750 rpm. and is available with either 1/3 or 1/2 hp. motor. Standard equipment includes a 5' or 6' long flexible tool shaft and quick-disconnect handpiece. With this handpiece, attachments can be connected and disconnected in a few seconds. This feature allows the operator to pull off the quick-disconnect handpiece and snap on another in a short period of time.

Also featured is a bench-height pedestal grinding, brushing or buffing operation. It also has a tool tray which

keeps accessories off the floor.

Stow Mfg. Co., 30 Shear St., Binghamton, New York.

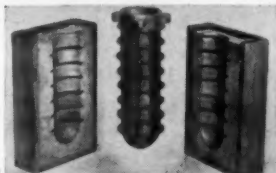
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### Tap Wrench Controls Torque

A tool to end all tap breakage due to excessive torque has been introduced by Twin City Machine and Tool Co. Tap Guard 625 is a hand-tap wrench

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*saves* TIME • LABOR • MONEY  
in chucking irregular workpieces



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Corp.

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A Precision Tool  
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at Any Desired  
Angle.



Horizontal motion is 360 degrees; vertical motion, 120 degrees. Fitted with vernier scale reading to 5 minutes.

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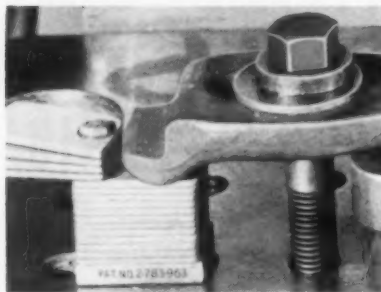
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that controls the torque for tap sizes No. 6, 8, 10, 12 and  $\frac{1}{4}$ ", eliminating the major cause of tap breakage. When maximum safe torque is reached for any reason, such as tap striking bottom of blind hole, material too hard, under-sized tap drill, tap not started straight, this tap wrench will slip automatically at point of setting.

Twin City Machine and Tool Co.,  
Crystal City, Mo.

Use postpaid card. Circle No. 151

#### Independent Lift Magnet

A self-contained, battery-operated lifting magnet is announced by The Ohio Electric Mfg. Co.

According to the company, this shop-lifter magnet is designed for use indoors or outdoors since it is completely independent of proximity to electric power lines. Length of haul is not restricted by electric cords or wires.

It is available in two models of 2500 or 5000 lb. lifting capacities, and weighs, 150 or 230 lbs., including batteries respectively. Both units are powered by 12-volt wet-cell type automotive batteries.

This lifter is equipped with a built-in trickle charger with plug-in receptacle. The control panel contains the On-Off switch and charging indicator.

The Ohio Electric Mfg. Co., Subsidiary of Howell Electric Motors Co., 5400 Dunham Road, Maple Heights, Ohio.

Use postpaid card. Circle No. 152

#### Optical Measuring Device Checks .0025" Dimensions

A precision optical tool weighing approximately 4 ounces designed to measure dimensions as fine as .0025" without physically superimposing the reticle on the work is announced by the National Tool Co.

Called a Mirroptic comparator, it consists of a die-cast aluminum frame, housing a reflective mirror of the beam

splitter type which allows 50% of the light to be transmitted and 50% to be reflected.

The lens is a two element cemented doublet of the antistigmatic type and provides five power magnification. A shock proof, scratch resistant acrylic plate supports the part to be measured at the desired focal plane.

Reticles are made of mylar type film and may be turned independently within the reticle container when rotating the tool is not desirable. Two blank reticle discs are supplied with each comparator.

National Tool Co., 11222 Madison Ave., Cleveland 2, Ohio.

Use postpaid card. Circle No. 153

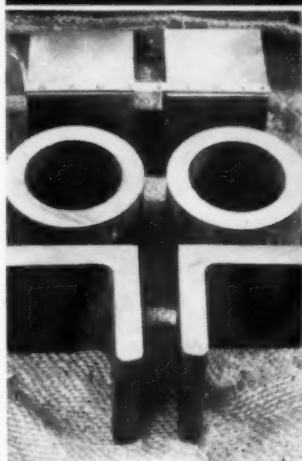
### Toolholder Has Cam Action Lock

A toolholder for disposable carbide tooling has been developed by G. E. This device, called a Carb-O-Lock toolholder, is a cam action lock. The insert is engaged by an eccentric on the central cam pin. This provides a positive lock that can't be loosened by vibration or pressure of the cut. As locking is inside the insert rather than



August, 1961

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# 3!

operations  
or just  
1/2  
operation  
per end.

How do you  
do jobs  
like this in  
your shop  
now?

And in the process the metal was also  
severed or CUT AT THE SAME TIME.

24 seconds to cut the 2 squares  
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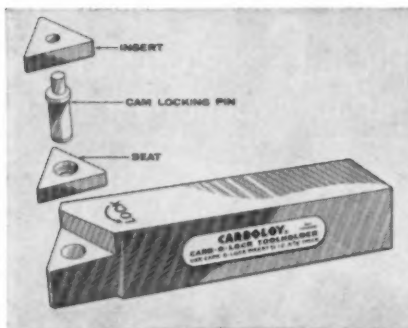
## WALLACE

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247



outside, there are no protruding screws or clamps.

G. E. tests indicate that the insert will break before it will loosen from the locking mechanism. Yet it is easily indexed. A self-cleaning, self-locating wrench socket is underneath.

Compact design permits greater work clearances and makes ganging practicable. The holder may be used in many

boring setups, and also in applications in automatic machines.

The cam pin is of high-alloy bearing steel. Carb-O-Lock is offered in 15 styles and 124 sizes for triangular and square inserts. Shank sizes range from 1/2 square to 2" square.



Metallurgical Products Dept., General Electric Co., Detroit 32, Mich.

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### Lightweight Macroscope Features Zoom Optics

A lightweight zoom macroscope, designed for on-the-spot examination or measurement of objects, has been announced by Bausch & Lomb. Features

include an automatic prefocus gage, tripod leg construction for portability, and an optical system which provides continuous magnification from 10X to 30X.

This unit can be used for inspection and quality control. Zoom optics allow operator to vary magnification over the entire range of the instrument simply by rotating the power changer ring. Field of view is 0.420" at 10X, and 0.240" at 30X.

Bausch & Lomb Inc., Rochester 2, New York.

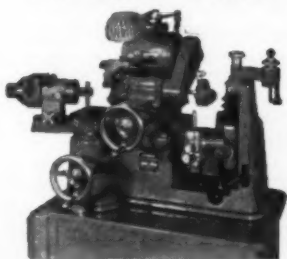
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### Nylon Web Pads Remove Rust, Burrs

Quick removal of rust, burrs, and scratches from all types of metal in hand operations is possible with two nylon web pads announced by Minnesota Mining and Mfg. Co. Called "Scotch-

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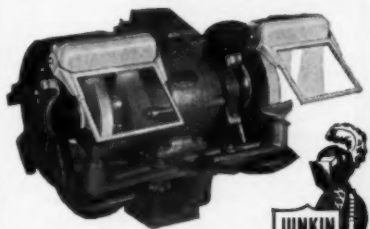
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**HENRY P. BOGGIS COMPANY**

710 E. 163rd Street, Cleveland 10, Ohio

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August, 1961



### The Shield which COMMANDS OPERATOR SAFETY

This new shatter-proof Electro-Lock Shield, due to its interlocked power and light circuits, will not permit a machine to be operated when the Shield is not in a full protective position.

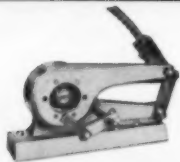
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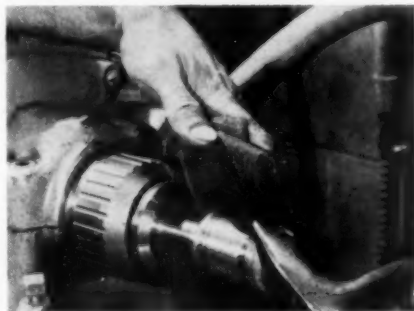
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brite", they are available with abrasive particles impregnated into the pads in either of two grades. The general purpose pad is a fine grade, and the other, ultra fine. Both measure approximately 9 1/2" x 6 1/4" x 1/4".

They will remove surface carbon, handmarks, and stains from all metals. They clean copper annodes in plating tanks and scour molds used to form



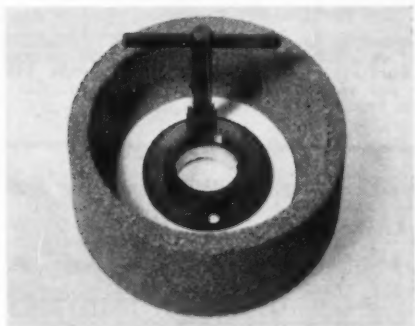
plastic and glass. They are used for scuffing prior to painting, removing slivers and burrs from aluminum parts after anodizing, and for general cleanup work. They blend welds, especially on stainless steel and aluminum.

Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 1, Minn.

Use postpaid card. Circle No. 157

### Gearnut Secures Grinding Wheels

Headbloom Products is offering a gearnut to mount grinding wheels on all types of surface, cutter, O.D., and I.D. grinders. This gearnut replaces conventional spanner wrenches and can be used for mounting recessed, cupped, and rubber grinding wheels by setting the wheel in position on the spindle, sliding the washer on, and starting the threaded gearnut with the fingers. A key wrench is then used to tighten the



gearnut as required.

Abuse of precision spindles and breakage of expensive grinding wheels are eliminated.

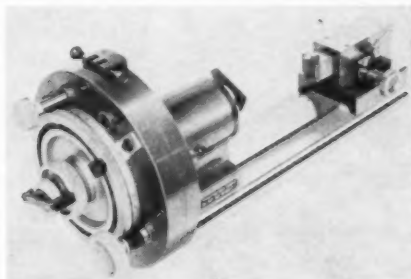
Headbloom Products, Inc., 6827 E. Seven Mile Road, Detroit 34, Mich.

Use postpaid card. Circle No. 158

### Index Center for Form Grinding

Moore Special Tool Co. has developed an index center which is claimed to achieve peak precision when form grinding spiders, splined punches, gear die punches and dies, and sectional parts of dies, where revolving the part on centers or in a spindle is necessary.

Features include a special ball construction spindle, a lapped carbide index plug, and four lapped-fit carbide plug-in stations. The extra station allows the user to turn his workpiece 180° at any time to get his work on dead center. It can also be used to reorient



August, 1961

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MINIATURE** Actual Size

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Advertisements acceptable in THE MARKET PLACE include those for employment, sales services, production facilities, representation and related needs. Rates: \$20 per column inch per insertion. Maximum size advertisement accepted in this section is three inches.

Copy should reach us by the first of the month for next month's issue.

MACHINE and TOOL BLUE BOOK A Hitchcock Publication Wheaton, Ill.

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These slides are built to take steady use. All are fitted with tapered gibs. Available in 2, 3, 4, 5, 6 and 8 inch widths.

**Biddle Engineering Co.**  
P.O. Box 98 Warrendale, Pa.

for a different set of angles on the same workpiece. There is an adjustable tailstock, and center line up is maintained with lapped-fit ram movement of center. Offset tailstock construction allows clearance for wheel when slot grinding. Sealed against dirt, the Moore center can also be used in wet grinding.

Moore Special Tool Co., Inc., Bridgeport 7, Conn.

Use postpaid card. Circle No. 159

## Three Tool Shapes Expand Adjustable Cartridge Line

Three tool shapes have been added to the DeVlieg line of adjustable Microbore cartridges. These tool shapes are cartridge styles for chamfering operations when machining with standard adjustable Microbore units. They are offered in sizes 1 through 10 (3/16" through 1" diameters) and are referred to as styles 24, 54, and 9.

Style 24 is a 45° chamfering tool when mounted at the standard Microbore tool angle; style 54 is 45° tool when mounted at 90° in a boring bar;

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Eliminate Scuffing, Metal Pickup, by  
CARBIDE COATING  
.0005" Thick  
ONE DAY SERVICE.

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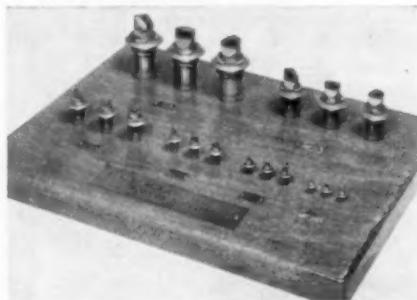
- ★ Dial Indicators
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- ★ Comparators
- ★ Dial Bore Gages
- ★ Precision Levels
- ★ Vernier Tools

**W. HOOPMANN, INC.**  
4517 Milwaukee Ave. Chicago 30, Ill.

and style 9 is a square end cutting edge cartridge that can be used for chamfering angles other than 45° when mounted at the required angle. It can also be used as a plunge-facing tool.

Microbore division, DeVlieg Machine Co., Royal Oak, Mich.

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# Products Index

## A

Abrasive Belts, Discs, Wheels,  
Stones, etc., **4, 41, 220, 260**  
Abrasive Belt Machines, **181**,  
210, 242  
Alloys, low-melting, **245**  
Angle Plates, **232**  
Angles, **232**  
Assembly Machines, **175, 179**

## B

Balancing Machines, **6**  
Balancing Tools, **212**  
Bar Machines, hand, **2**  
Bar Machines, single spindle, **91**  
Bearings, outer-support, **180**  
Bending & Forming Machines,  
189, **242**  
Blocks, riser, **246**  
Boring Bars, **74, 171, 233**  
Boring, Drilling & Milling  
Machines, floor, **85, 86, 166**  
Boring Heads, **74, 89, 240**  
Boring Machines, **178**  
Brakes, disc, **220**  
Broaches, **168**  
Broaching Machines, **184**  
Burs, carbide, **66, 67, 197, 229**  
Bushings, brass & bronze, **225**  
Bushings, drill & jig, **74**

## C

Calipers & Dividers, **90**  
Cams, **207, 211, 248**  
Cemented Carbides, **171**  
Centers, indexing, **251**  
Centers, live, **242, 256**  
Chilling Machines, **174**  
Chuck Jaws, **234**  
Chucks, collet, **74**  
Chucks, gear, **199**  
Chucks, jaw, **199**  
Chucks, lathe, **199**  
Chucks, magnetic, **29**  
Chucks, quick-change, **74**  
Clamps, fixture, **162, 185**  
Cleaners, **203**  
Clutches, **255**

Collet Stops, **241**  
Collets, **33, 151**  
Compaction Machines, **172**  
Comparators, electronic, **83**  
Comparators, optical, **246**  
Coolant Spraying Systems, **146**,  
**204, 206, 241**  
Coolants, **43, 82**  
Countersinks, **1, 180**  
Couplings, flexible, **222**  
Cut-Off Machines, **53, 55, 91**,  
**142, 190, 198, 217, 247, 250**  
Cut-Off Machines, abrasive, **51**,  
**61, 172, 183, 244**  
Cut-Off Tools, **223**  
Cylinders, Air, **79, 196**  
Cylinders, hydraulic, **79**

## D

Deburring Machines & Tools, **1**,  
**21, 182, 224, 234**  
Die Filers, **236**  
Die Makers' Supplies, **192, 196**  
Die Sets, **192**  
Dies, **230**  
Dies, button, **66, 67, 173, 261**  
Dies, press brake, **19**  
Dressers, angle & radius, **208**  
Dressers, diamond, **183, 218**  
Drill Heads, **31, 175**  
Drill Heads, multiple spindle,  
**27, 159, 200, 215**  
Drill Jigs, **256**  
Drill Point Grinding Machines,  
**166**  
Drilling Attachments, **217**  
Drilling Attachments, multiple  
spindle, **27, 159, 200, 215**  
Drilling Machines, automatic,  
**14, 15**  
Drilling Machines, bench, **75**,  
**152, 174**  
Drilling Machines, gun, **259**  
Drilling Machines, multiple  
spindle, **164**  
Drilling Machines, press, **75, 157**,  
**174, 186**

Drilling Machines, sensitive, **147**  
Drilling Machines, turret, **14, 15**,  
**152**  
Drilling Systems for odd shapes,  
**234**  
Drilling Units, **186**  
Drills, **37, 66, 67, 205, 213**  
Drills, carbide, **205, 213**  
Drills, center, **21**  
Drills, pneumatic, **224**  
Drives, **165, 211**  
Dust Collectors, **193, 264**  
Dust Control Systems, **75, 193**

## E

End Mills, **37, 66, 67, 182, 195**,  
**197, 205**  
Engraving Machines, **32, 207**

## F

Feed Fingers, **151**  
Feeds, press, **25**  
Feeds, stock, **142, 187**  
Files, hand, **Back Cover**  
Filtration Equipment, **168**  
Flanging Machines, **243**  
Flat Stock, ground, **Back Cover**  
Forging Equipment, **238**  
Forming Machines, **91**  
Furnaces, heat-treating, electric,  
**172, 231, 237**  
Furnaces, heat-treating, gas, **238**

## G

Gage Blocks, **68**  
Gages, bore, **68**  
Gages, electronic, **68**  
Gages, height, **68, 178, 235, 242**  
Gages, internal, **68, 230**  
Gages, pedestal, **68**  
Gages, plug, **68, 173**  
Gages, special, **68**  
Gages, thread, **68, 173**  
Gantries, **192**  
Gear Hobbing Machines, **72, 73**,  
**76, 77, 81**  
Gears, **201, 243**

**NOTE: Bold face indicates products which are described in advertisement in this issue.**

Grinders, abrasive belt, **181**,  
210, 242  
Grinders, carbide tool, **194**  
Grinders, pedestal, **183, 194, 209**,  
245, **264**

Grinders, tap, **244**  
Grinding Attachments, **193, 250**,  
251  
Grinding Fixtures, tool & cutter,  
233  
Grinding Machines, drill point,  
166, 222, **264**  
Grinding Machines, profile, **260**  
Grinding Machines, surface, **177**,  
**181**

## H

Hammers, lead, **186, 240**  
Handles, machine, **234**  
Hardening Machines, flame, 205  
Heating Machines, induction, 209  
Hinges, continuous, **238**

## I

Inserts, threaded, 237  
Inspection Equipment, magnetic,  
212  
Inspection & Measuring Devices,  
**78, 156, 175, 237, 238, 249**

## J

Jig Bore, **68, 144, 239**  
Jig Boring Service, **243**  
Jig Grinders, **144**  
Jig Grinding Service, **243**  
Jigs & Fixtures, **160, 162, 185**,  
**234, 246**

## K

Keyseaters, **167, 168, 191, 228**  
Knives, shearing, 213  
Knurlers, hand, **248**

## L

Lathe Attachments, 165, 202  
Lathe Attachments, tracer, 202  
Lathes, engine, **Inside Front**  
**Cover, Inside Back Cover, 68**,  
**71, 150**  
Lathes, speed, **264**  
Lathes, threading, 17  
Lathes, tracer, **Inside Front**  
**Cover**

Lathes, turret, **2, 68**  
Layout Dye, **244, 250**  
Layout Equipment, **156**  
Lubricators, 235

## M

Machine Builders, special, **75**,  
**160**  
Machine Controls, 165, **211**  
Magnetic Separators, 165  
Magnets, 246  
Mandrels, expanding, threaded,  
213  
Marking Machines, **178, 220, 225**  
Marking Stamps, **181, 241**  
Measuring & Checking Equipment,  
**78, 156, 175, 204**  
Metallizing, **48, 49**  
Microscopes, toolmakers, **175**  
Milling Cutters, **57, 66, 67, 171**,  
**195, 231**  
Milling Machine Attachments,  
**191, 208**  
Milling Machines, horizontal, **8**,  
**9, 13**  
Milling Machines, planer type,  
**153, 154, 155**  
Milling Machines, vertical, **8, 9**,  
**13, 88, 150, 158**  
Mills, hollow, **210**  
Mist Collectors, **189, 264**  
Multi-operation Machines, 164

## N

Notching Equipment, **150**  
Notching Units, 214

## P

Pantographs, **32**  
Pins, locating, **74, 251**  
Pins, taper, **251**  
Plates, angle, **245**  
Polishing Machines, **47, 170**  
Press Brakes, **69, 188, 200, 202**  
Presses, arbor, **183**  
Presses, automatic, **70, 211, 226**  
Presses, four-slide, 163  
Presses, gap, **236**  
Presses, hydraulic, **69, 188, 200**  
Presses, O.B.I., **25, 236**  
Presses, punch, **169, 207**  
Presses, straight side, **236**  
Profiling Machines, **68**

Pumps, coolant, lubricant & oil,  
**75, 146**  
Punches & Dies, **78, 84, 187, 204**,  
**237, 249**  
Punching Machinery, **78, 150**  
Pushers & Pusher Tools, **151**

## R

Reamers, **213**  
Riveting Machines, **239**  
Roll Forming Machines, 182

## S

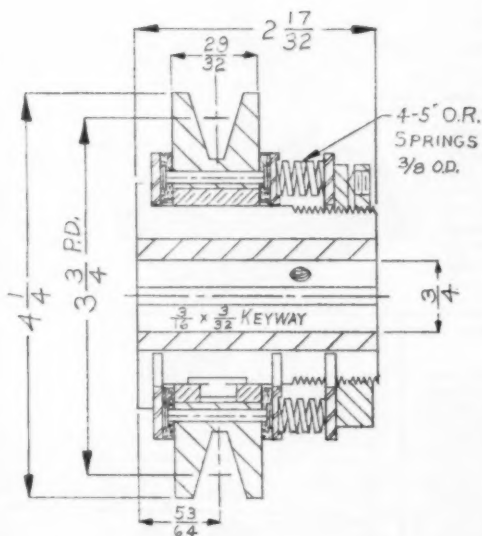
Safety Devices & Equipment, **249**  
Saw Blades, band, **Back Cover**  
Saw Blades, circular, **21**  
Saw Blades, hack, **23, 55, 262**,  
**Back Cover**  
Saw Sharpening Machines, **242**  
Sawing Machines, band, **53, 217**  
Sawing Machines, hack, **55**  
Saws, hole, **Back Cover**  
Saws, portable power, hack, **238**  
Saws, slitting, **21, 161**  
Scrappers, **212**  
Screws, socket, **80**  
Sealants, **230**  
Seals, **227**  
Shearing Machines, **190, 243**  
Shears, portable, **150**  
Sine Bars, **234**  
Sine Plates, **29**  
Slotters, **21**  
Soldering Tools, **223**  
Speed Reducers, **211**  
Spindles, milling, **208**  
Spotter Sets, **186, 240**  
Spring Coilers, **197, 248**  
Steel Selection, **59, 134, 135**,  
**201, 227**  
Storage Equipment, **176, 199, 201**  
Straightening Equipment, **198**  
Surface Finish Measuring  
Equipment, **214**  
Swaging Machines, **11**  
Switches, electric, **170**

## T

Tables, duplicator, **211**  
Tables, elevating, **194, 203**  
Tables, indexing, **68, 196, 211**  
Tables, rotary, **185, 244**  
Tachometers, **216**  
Tap Holders, **39, 245**

**NOTE: Bold face indicates products which are described in advertisement in this issue.**

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Tappers, 221, 251  
Tapping Units, 221, 222  
Taps, 45, 173, 261  
Testing Machines, 170, 243  
Threading Machines, 17  
Threading Tools, 136  
Tool Holders, 39, 74, 162, 171, 190, 233, 247, 256  
Tool Holders, floating, 39, 74, 190, 216  
Tool Presetting Machines, 78, 204  
Tools, boring, 35, 87, 195, 233, 252

Tools, carbide, 171, 195, 197, 205, 213, 229  
Tools, porting, 195  
Tools, quick-change, 35  
Tools, turning, 162  
Truing Rings, 256

## U

Ultrasonic Generators, 184

## V

Valves, 218  
Valves, air, 196, 218

Vibration Units, 47  
Vises, 74, 176, 185, 188, 235, 239, 244, 256  
Vises, bench, 176  
Vises, tool makers', 185, 235, 244

## W

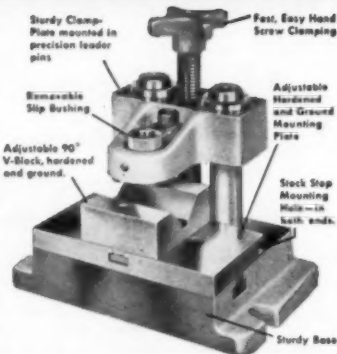
Welding Equipment & Supplies, 218  
Wrenches, combination, 233  
Wrenches, industrial, 162, 232, 233  
Wrenches, socket, 228

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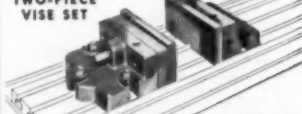


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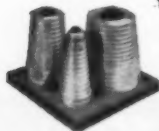
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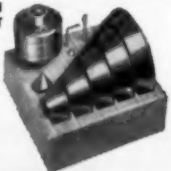
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# Index to Advertisers

# BB

## A

A. K. Tool Company, Inc.	243
Aaron Machinery Company	150
Ace Drill Corporation	213
Acromark Corporation	241
Adam Tool Company	234
Advance Car Mover Company, Inc.	248
Aget Manufacturing Company	189
Allegheny-Ludlum Steel Corporation	59
Allen Air Corporation	196
Allen Collet Manufacturing Company	151
Allen Manufacturing Company	80
American Cam Company, Inc.	207
American Chain & Cable Company (Allison Campbell Division)	51
American Saw & Manufacturing Company	Back Cover
American Standard Company	235
American Sealants Company, Inc.	230
American Tool Works Company	Third Cover
Amitool Company	235
Anderson Bros. Manufacturing Company	212
Armstrong-Blum Manufacturing Company	55
Armstrong Bros. Tool Company	162
Auto Moulding and Manufacturing Company	238
Avey Division	186
(Motch & Merryweather Machinery Co.)	

## B

B and S Machinery & Supply Company	246
Baldor Electric Company	194
Barnes Company, Inc., W. O.	262
Beaver Gear Works	243
Beaver Pipe Tools, Inc.	61
Belhows-Valvair	31
Benco Collet Manufacturing Company	33
Biddle Engineering Company	252
Bijur Lubricating Corporation	206
Blanchard Machine Company	4
Bliss Company, E. W.	25
Blue Valley Manufacturing Company	243
Boggis Company, Henry P.	249
Bokum Tool Company	87
Brightboy Industrial Division (Weldon Roberts Rubber Company)	41
Brown and Sharpe Manufacturing Company	161
Buffalo Forge Company	75
Burgmaster Corporation	14-15, 152
Bystrom Company	241

## C

Cam Services Company	248
(Division Himoff Machine Co.)	
Cerro Sales Corporation	245
Cincinnati Electrical Tool Company	264
Cincinnati Lathe & Tool Company	71
Cincinnati Milling Machine Company	8-9
(Cincinnati Milling Machine Products Div.)	
Cincinnati Milling Machine Company	82
(Milling Machine Division)	
Circular Tool Company	21
Cleveland Crane & Engineering Company	69
Cleveland Punch and Shear Works Company	84
Columbia Tool and Die Works	222
Columbus Die-Tool and Machine Company	160
Commander Manufacturing Company	200
Conway Clutch Company	265
Cook Lead Hammer Service	186
Cooley Electric Manufacturing Corp.	231
Covel Manufacturing Company	2, 177
Criterion Machine Works	89
Crucible Steel Company of America	134-135

## D

Danly Machine Specialties Company	192
Davis Keyseater Company	228
Defiance Machine & Tool Company	225
Delta Power Tool Division (Rockwell Manufacturing Company)	157
Desmond-Stephan Manufacturing Company	176
DeVlieg Microbore	35
(Division DeVlieg Machine Company)	
Di-Acro Corporation	19, 250
Dixie Tool Industries, Inc.	197
Donley Products Company	180
Dreis & Krump Manufacturing Company	188
duMont Corporation	168
Dykem Company	244

## E

Eisler Engineering Company	211
Electro-Mechano Company	174
Empire Tool Company	39
Ex-Cell-O Corporation	29

# F

Federal Products Corporation .....	83
Federal Tool & Manufacturing Company .....	237
Fellows Gear Shaper Company .....	76-77
Fenn Manufacturing Company .....	11
Flynn Manufacturing Company .....	240

# G

Gaertner Scientific Corporation .....	175
Giddings and Lewis Machine Tool Company .....	149
Gisholt Machine Company .....	17
Grant Mfg. & Machine Company .....	239
Gray Company, G. A. ....	153-154-155
Green Instrument Company .....	32
Greenerd Arbor Press Company .....	183
Grob, Inc. ....	53

# H

H. B. Tool Company .....	178
Hammond Machinery Builders .....	181
Havr Manufacturing Company .....	226
Hayden, Howard A. ....	252
Heimann Manufacturing Company .....	240
Himoff Machine Company .....	248
(Cam Services Division)	
Hoopmann Inc., W. ....	252
Huppert Company, K. H. ....	172
Index Machine Company .....	88

# J

J & S Tool Company .....	148
Jarvis Corporation .....	159
Jergens Tool Specialty Company .....	234
Johnson & Son, Inc., S. C. ....	43
Johnson Machine & Press Corp. ....	236
Junkin Safety Appliance Company .....	249

# K

Kenco Manufacturing Company .....	169
Keo Cutters, Inc. ....	180
Kitzman Manufacturing Company .....	240

# L

Landis Machine Company .....	136
Lassy Tool Company .....	239, 251
Lees-Bradner Company .....	81
Leland-Gifford Company .....	259
Levin and Son, Inc., Louis .....	147
Linley Brothers Company .....	239
Lodge and Shipley Company .....	2nd Cover
Logansport Machine Company .....	79
Lucas Machine Division .....	85-86
(New Britain Machine Co.)	
Lucifer Furnaces, Inc. ....	237

# M

Machine Products Corporation .....	232
Manhattan Supply Company .....	199
Meehanite Metal Corporation .....	201
Metco, Inc. ....	48-49
Micrometrical Manufacturing Company .....	214
Midwest Tool & Engineering Company .....	203
Mill-All Company .....	205
Minster Machine Company .....	70
Mitts & Merrill Manufacturing Company .....	167
Modern Machine Tool Company .....	91
Moore Special Tool Company .....	144
Morse Twist Drill & Machine Company .....	37
Motch & Merryweather Machinery Company (Avey Division) .....	186

# N

National Machine Tool Company .....	191
Neise, Karl A. ....	90
New Britain Machine Company .....	85-86
(Lucas Machine Division)	
Nicholson File Company .....	23
Nielsen, Inc. ....	242
Noble & Westbrook Manufacturing Company .....	220
Norton Company .....	72-73

# P

Palmgren Products, Inc. ....	244
Pannier Corporation .....	181
Peaslee Metal Products Company .....	251
Pines Engineering Company .....	142
Pioneer Electric and Research Corp. ....	216
Portage Double-Quick, Inc. ....	57
Pratt & Whitney .....	65-66-67-68
Procurier Safety Chuck Company .....	221
Pryor Marking Products .....	238

# Q

Queen City Machine Tool Company .....	209
---------------------------------------	-----

# R

R. B. Tool Company .....	198
Rice Pump and Machine Company .....	236
Richards Company, J. A. ....	242
Rockford Engineered Products Company .....	256
Rockwell Manufacturing Company .....	157
(Delta Power Tool Division)	
Rockwin Manufacturing Company .....	248
Rothfuss Tool Company .....	208
Ruthman Machinery Company .....	146

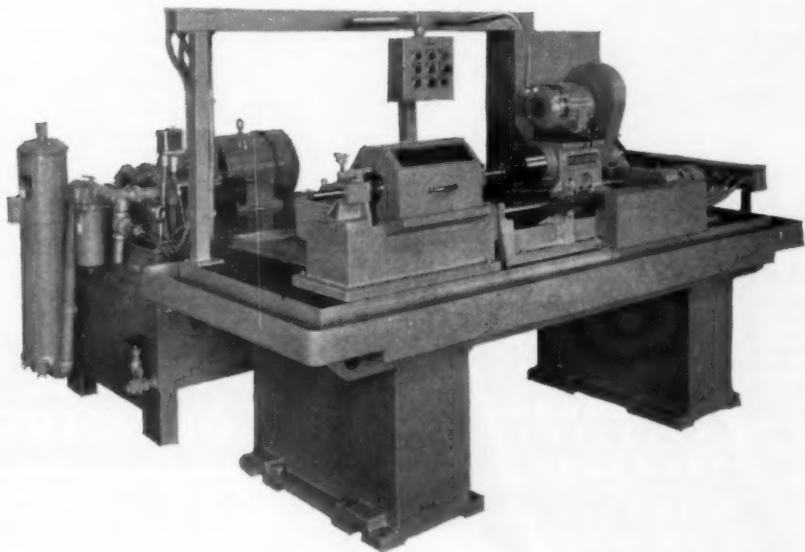
# S

Sales Service Manufacturing Company .....	238
Sanford Manufacturing Company .....	63

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Schupack Supply Company .....	260
Scully-Jones and Company .....	190
Severance Tool Industries, Inc. ....	229
Sheffield Corporation .....	156
Sid Tool Company .....	261
Somma Tool Company .....	223
Sossner Tap & Tool Company .....	45
South Bend Lathe, Inc. ....	158
Spellman Company, R. L. ....	186
Star Cutter Company .....	260
Stewart Warner Corporation .....	6
Sturdy Broaching Service .....	233
Syntron Company .....	47

## T

Tahlen Hammer Company .....	242
(Div. H. F. Soderling Co.) .....	
Tamm Industries, Inc. ....	250
Thriftmaster Products Corporation ..	27
Torit Manufacturing Company .....	193
Tree Tool and Die Works .....	13
Trico Fuse Manufacturing Company ..	204

## U

U. S. Automatic Box Company .....	245
Universal Engineering Company .....	74
Universal Vise and Tool Company .....	184-185

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260

## V

Vanadium Alloys Steel Company .....	227
Vernon Devices, Inc. ....	182
Victor Machinery Exchange, Inc. ....	183
Victory Diamond Tool Company .....	218
Viking Tool Company .....	171
Vogel Tool & Die Corporation .....	187

## W

Wales-Strippit Company .....	78
Wallace Supplies Manufacturing Company .....	247
Wardwell Manufacturing Company .....	242
Watts Brothers Tool Works .....	234
Weldon Roberts Rubber Company (Brightboy Industrial Division) .....	41
Weldon Tool Company .....	1
Wells Manufacturing Company .....	217
Wesco Tool, Inc. ....	241
Western Tool Supply Company .....	173
Wetmore Tool & Engineering Company ..	195
Whistler & Sons, Inc., S. B. ....	219
Wilson, Inc., Thomas C. ....	224
Wirth & Son Company, Carl A. ....	210
Woodson Tool Company .....	182

## Z

Zagar, Inc. ....	215
------------------	-----

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0	70-72-76-80	1/2	12-13-14-16-18-20-24-27-28-32-36-40	1-13/16	8-10-12-14-16-18-20-24-32
1	48-56-64-72-80-90	9/16	12-14-16-18-20-24-27-28-32-36-40	1-7/8	5-8-10-12-14-16-18-20-24
2	48-52-54-56-64-72-80	5/8	10-11-12-14-16-18-20-24-27-28-32-36-40	1-15/16	5-6-8-10-12-14-16-18-20
3	40-44-46-48-56-60-64	11/16	10-11-12-14-16-18-20-24-27-28-32-40	2	8-10-12-14-16-18-20
4	32-36-40-48-56-60-64	3/4	10-11-12-14-16-18-20-24-27-28-30-32-36-40	2-1/16	12-14-16
5	30-32-36-40-44-48-56-64-80	13/16	10-12-14-16-18-20-24-27-32	2-1/8	8-10-12-14-16-18-20
6	30-32-36-40-48-56-60-64	7/8	9-10-12-14-16-18-20-24-27-28-32-40	2-3/16	16-18-20
7	30-32-36-40-48-64	15/16	8-9-10-12-14-16-18-20-24-27-32-40	2-1/4	4-1/2-8-10-12-14-16-18
8	24-30-36-40-44-48-56-60-64-80	1	8-10-12-14-16-18-20-24-27-32-40	2-5/16	12-14-16-18
9	24-28-32-36-40	1-1/16	10-12-14-16-18-20-24-27-32	2-3/8	10-12-14-16-18
10	28-30-36-40-48-56-60-64	1-1/8	7-8-10-12-14-16-18-20-24-27-32-40	2-1/2	4-8-10-12-14-16-18
12	20-22-24-28-30-32-36-40-56-60	1-3/16	8-10-12-14-16-18-20-24-27-32	2-9/16	12-14
14	20-24-28-32-40	1-1/4	7-8-10-12-14-16-18-20-24-27-32	2-5/8	8-10-12-14-16-18
1/16	60-64-72	1-5/16	6-8-10-12-14-16-18-20-24-27-32	2-3/4	4-8-10-12-14-16
5/64	72	1-3/8	6-8-10-12-14-16-18-20-24-27-32	2-7/8	8-10-12-14-16
3/32	36-48	1-7/16	8-10-12-14-16-18-20-24-27-32	3	4-8-10-12-14-16
1/8	32-36-40-44-48	1-1/2	6-8-10-12-14-16-18-20-24-27-32	3-1/4	8-10-12-14-16
5/32	32-36-38-40-44-48	1-5/8	5-1/2-6-8-10-12-14-16-18-20-24	3-1/2	8-10-12-14-16
3/16	20-24-28-32-36-40-48	1-11/16	6-8-10-12-14-16-18-20-24	4	8-10-12
7/32	20-24-28-32-36-40				
1/4	14-16-18-22-24-26-27-28-30-32-36-40-48-56-64				
9/32	18-20-24-27-28-32-40-64				
5/16	16-18-20-22-24-26-27-28-30-32-36-40-48-64				
11/32	20-28-32-40-48				
3/8	12-13-14-18-20-22-27-28-30-32-36-40-48				
13/32	16-20-24-32				
7/16	12-14-16-18-20-24-27-28-32-36-40				



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SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
0	80	3/8	16-24-32	1-3/8	6-8-10-12-16-18-20-24
1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	6-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	11/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12	2	4-1/2-10-12
5/16	18-20-24-28-32	1-1/4	7-12-16-18		

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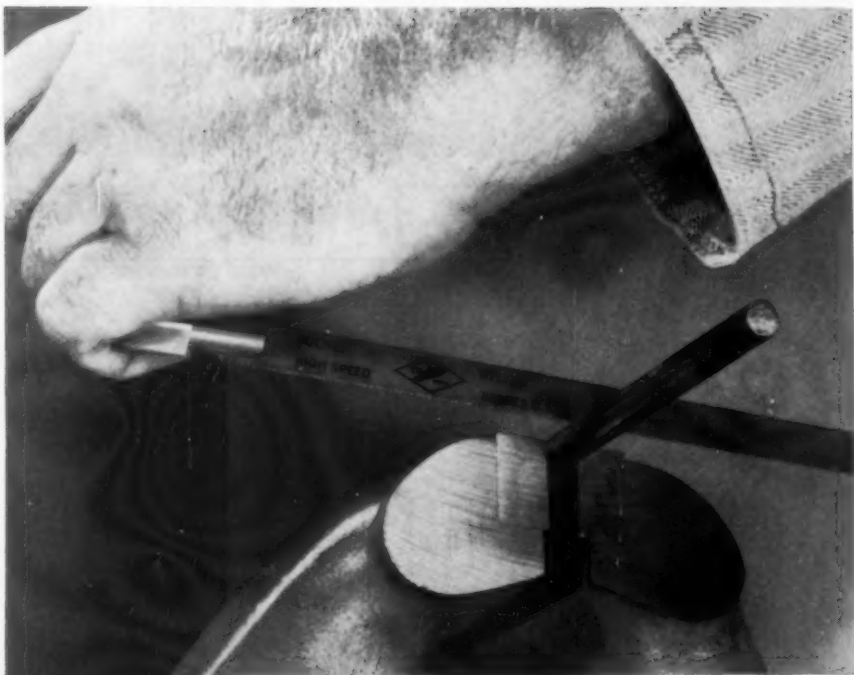
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MACHINE and TOOL BLUE BOOK



## ONE LAST WORD

**B  
B**

### Control Non-Productive Labor Costs

**Y**ou may remember an old cartoon showing a man shoveling snow off his sidewalk. He threw the snow over his shoulder and when he arrived at the end of the walk discovered that the snow he'd shoveled away in front had landed behind him and his walk was still knee-deep in snow. Industry could well be in danger of doing the same thing in the realm of productive and non-productive labor.

Automation, semi-automation and efficient utilization of improved methods have cut sharply into the productive labor force. Their number will decline in the years ahead. In contrast, the number of non-production workers has increased. Thus, while management has decreased its productive labor force costs, it has increased its non-productive labor costs. If one would improve methods, reduce costs and analyze production problems—if one would substitute machines for muscles, one must have people to design, build and service them.

There appears to be an area here for cost reductions. At first blush it might seem cold-blooded and unkind to suggest that the same people who have been instrumental in reducing productive labor costs should be subjects of analysis. Yet, good business management makes such investigations and analyses mandatory. High rewards may be reaped by business in this area because so very little scientific investi-

gation has been carried on by industry in this field. Non-productive activities have grown, in many instances, willy-nilly to a point where money saved by reducing productive labor time is being eaten up by the non-productive activities which first produced the savings.

There is no reason why the same reliable and proven measurements which have been applied so successfully to line cannot be adapted to staff functions. Analysis, measurement, standards, incentives and other tried techniques can be used with worthwhile results. To be sure, there will be areas where accepted techniques defy application; here new methods must be introduced and it could well be that an entirely new interpretation of a system may be developed. This would be a definite contribution to sound management practice which the engineering profession could make.

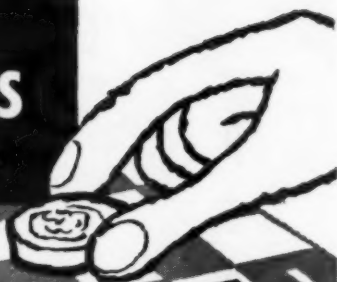
One must not be unmindful that giant-like strides have been made by the business machine manufacturers to automate office procedures; however, there remain many areas which do not lend themselves to mechanical operation and where any improvement, however small will pay big dividends. Such improvements will primarily be in the realm of better utilization of the brains, imagination and abilities of people.

If we must shovel the sidewalk, let's not throw the snow behind us.

*Wm. F. Schleicher*

Publisher

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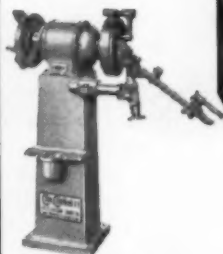
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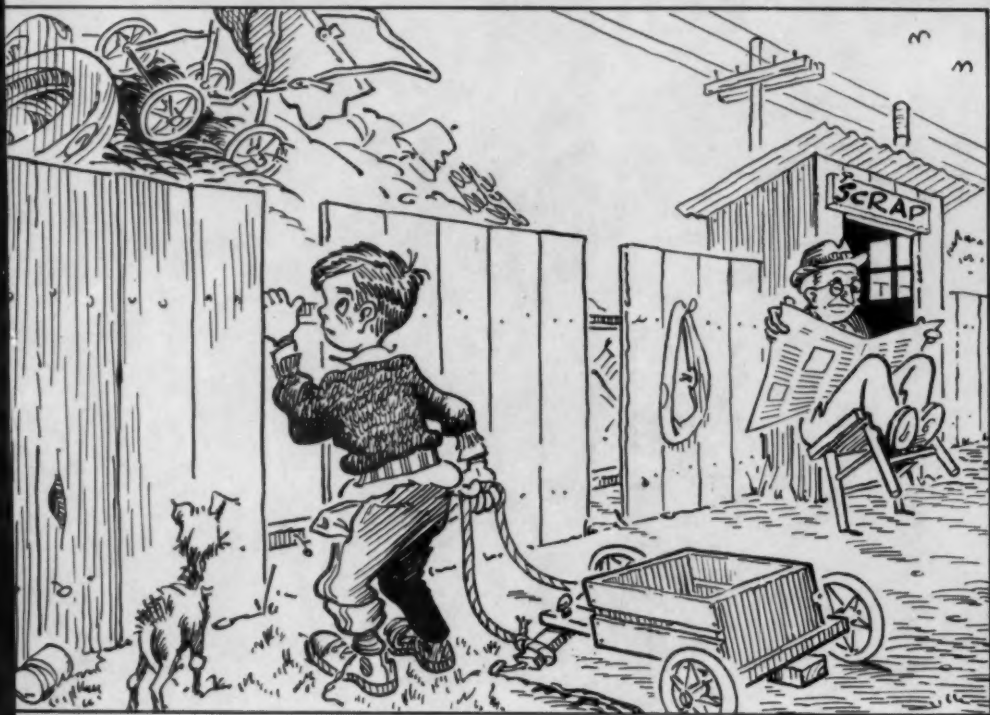
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## You Couldn't Afford Scrap?

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Take the United States Beryllium Corporation, for example . . .

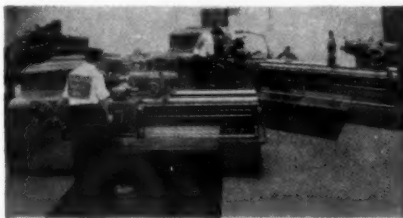
To produce 9" diameter memory drums for computers from the light but strong space-age metal, beryllium, requires extreme precision. Specifications for these drums called for lathes which would hold flatness, roundness, squareness and size to .0001" or less. Because the raw material is extremely expensive, scrap would be disastrous. Anything less than the best lathe could not be considered.

That's why the United States Beryllium Corporation plant at Inglewood, California chose American Lathes. According to Mr. Frank Hevrdejs, Vice President of U. S. Beryllium, their Americans are turning perfectly round within .000050" to help produce these beryllium memory drums with an absolute minimum of scrap.

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